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FOUNDED JAN. 1949

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A limited number of back issues of the NOTES are available, $1.50 postpaid per copy.

Dues for all members are due and payable for the following year beginning each September, as follows; full membership $9.00 per year, family membership $11.00 per year, corresponding membership $7.00 per year in the United States; overseas membership $9.00 per year paid in U.S. currency.

The Treasurer-Membership Chairman should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

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SCHEDULE OF MEETINGS - 1992 - 1993

PLEASE NOTE: There are differences in date, day and time for our meetings from month to month (unlike previous years.) Consult the current edition of the NOTES for confirmation of date, day and time of each meeting.

DAY	DATE	TIME
SEPTEMBER	MEETING CANCELLED	
Sunday	October 11, 1992	2 P.M.
Sunday	November 1, 1992	3 P.M.
Sunday	December 6, 1992	2 P.M.
Sunday	January 3, 1993	2 P.M.
Sunday	February 14, 1993	2 P.M.
Sunday	March 14, 1993	2 P.M.
Sunday	April 4, 1993	2 P.M.
Sunday	May 9, 1993	Social/Auction
Sunday	June 13, 1993	2 P.M.

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79th Street, New York City, except our Social/Auction. On our meeting days, you may gain admission to the Museum without paying a fee by presenting your New York Shell Club membership card.

The NEW YORK SHELL CLUB meets on the Second Sunday of each month, September to June, in Room 319 of the American Museum of Natural History, New York City (unless otherwise advised). Note that changes have been made in the schedule of meetings for the remainder of 1993 - plan accordingly. Please present your membership card from NYSC for admission to AMNH on meeting dates.

PROGRAM SCHEDULE

SUNDAY, March 14, 1993 at 2:00 p.m. - Rich Kelly from the Long Island Shell Club will speak on Shelling and Natural History, Newfoundland.

SUNDAY, April 4, 1993 at 2:00 p.m. - the program will be the panel discussion on "Dealing with Dealers" - see page 7 for details.

SUNDAY, May 9, 1993 - the annual NYSC auction/social meeting. We will again be at the Broadway Dance Studio, Astoria, Queens. See page 5 for details. A mailing and auction list will follow.

SUNDAY, June 13, 1993 at 2:00 p.m. - Sue Hobbs and Phil Dietz of Cape May, NJ will present a slide program - Shelling in Pacific Panama.

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ANNOUNCEMENT: You will notice that the last article above is reprinted from *Journal of Shellfish Research*, Vol. 11, No. 2, 1992, pp. 489-505. As this is a rather long article, it will be reprinted in three parts - five pages this issue, six pages in the June issue, and the final six pages in September. This subject of introduced Mollusca is an important one, and I hope you will find this article worthwhile. We need to know what humans have done in this regard.

HIGHLIGHTS OF RECENT MEETINGS

December 6, 1992: Henry Gordon suggested, as a possible program idea, a discourse by two or three members on dealing with shell dealers. After expressions of approval, Henry said he would work on getting such a program assembled.

President Al Scarpetti reported that the scheduled speaker, Sue Hobbs, had recently undergone a sinus operation and would be unable to appear. He added that Walter Sage had thrown himself into the breach and would present the program for the day.

Walter opened his presentation by mentioning the November issue of Bob and Dottie Janowskys' quarterly shell book price list. He then drew attention to a display of 19 books on shells, most published within the last two years, and a tray of bisected shells from the museum's collection. Also on display was a section sliced from a piling that had been retired from duty as part of a pier in the Hudson River. He pointed out many Teredo holes and tunnels liberally sprinkled on the cut surfaces, and noted that this indicates that water quality in the Hudson is improving.

Walter's chief display was 37 specimens of Pleurotomaria, representing 19 species, that have been donated to the American Museum by a collector in Scarsdale, New York. The collection now lacks in completeness only one of the Caribbean species, and is perhaps one of the best assemblages in museum collections.

Walter also noted that the Museum exhibit "Mollusks and Our World" had been recently reduced by the return of some of the man-made items to the institutions that had lent them. The spaces will be filled with specimens from some of the more "collectible" families of mollusks.

Henry reported that he had already assembled a panel that will present the program he had suggested. The members are Walter, Nick Katsaras, Al Scarpetti, and himself. The program is scheduled for the April meeting.

The door prizes were: the Roderick Cameron book "Shells", won by Chris Den Blahsen; Cypraea cinerea, won by Al Scarpetti; Conus gladiator, won by Romuald Czepulkowski, and Turbo argyrostoma, won by David Epstein.

January 3, 1993: President Al Scarpetti reminded members that donations of shells, related materials, and cakes would be needed for the annual auction, scheduled for the May meeting. He added that Leon Juster, who has already donated part of his collection to the American Museum, had set aside some shells for the Club, many of which will be offered in the auction. A mailing will go out to 36 dealers, requesting donations. A letter from Victor Wee that accompanied his donation of 19 shells, was read. NYSC members are urged to contribute their items by the March meeting, to facilitate preparation of the auction list, and to help Sol Weiss get them ready for the big event.

The door prizes were: Murex brevifrons, won by Chris Den Blahsen; Conus distans, won by Henry Gordon; Turbo sarmaticus, won by Phyllis Martignone; several shells donated by Henry Gordon, won by Milton Werner, and a copy of Louise Travers' "The Romance of Shells in Nature and Art", won by Theta Lourbacos.

The speakers for the day were Mel and Sylvia Springer who recalled, with slides and description, two recent shelling trips. The first took them to Sonora Bay, Guaymas, Mexico, in May, 1992. Their photos included scenery, flowers and the areas of their very succesful shallow-water collecting. They had good words for their accomodations at Club Med, but none for the high-powered jellyfish that guarded the shells. A trip to the Turks and Caicos Islands gave them a good look at an 80-acre Strombus gigas farm, fenced off and dedicated to the raising of the Queen Conch. The larvae of this essential food resource thrive on a concoction grown for them in tanks. The camera coverage included photos of living Strombus gigas. In an ensuing discussion of methods of cleaning shells at the time of collecting, Mel noted that he had found that leaving them in tap water for a time had proved to be effective.

February 14, 1993: President Al Scarpetti reviewed plans for the May auction meeting and repeated that donations should be brought to the March meeting. He added that the speaker for the March meeting would be Rich Kelly of the Long Island Shell Club, who would show slides of a collecting trip to Newfoundland.

Concerning the program for the April meeting, a panel discussion on "dealing with dealers", the four panelists - Henry Gordon, Walter Sage, Nick Katsaras and Al Scarpetti - conferred briefly to establish the categories to be covered by each, the order of presentation, and the use of photos.

Henry Gordon, the first speaker in the day's program of presentations by members, raised the question of pronunciation of generic and specific names. As his type specimen, so to speak, he chose Mitra regina. He said he had asked several European malacologists how he pronouned the name of this species, and they all said "Meetra regeena" - some using the hard G and some the soft. All of the North American malacologists he canvassed pronounced the I's as eye, and all used the soft G. In a discussion of pronunciation that followed, Henry made clear his preference for the principles followed by the Europeans. No one asked for clarification on the pronunciation of "miter".

Historian Nick Katsaras presented some of the interesting facts he discovered in reviewing the history of the presidency of the Club. He preceded many of his observations with questions - for example, of the 19 presidents, how many were women? It took a bit of individual digging and some conference to arrive at the answer - four. Nick accompanied his facts with photos.

Artist and cone specialist Al Scarpetti recalled how his early appreciation of Van Gogh was eventually surpassed by his admiration of Gauguin. A parallel to the latter's creativity with color is found, appropriately, in Conus gauguini, an example of which he displayed.

Romuald Czepulkowski's shells was Placostylus bollonsi, from islands offshore of the North Island, New Zealand. Romuald detailed the history of the species and commented that it was thought to have become extinct due to predation by goats. Originally, some 50 specimens had been collected, but after exploration of other islands nearby, an additional 120 specimens were located. The goats were later exterminated to try and preserve the snail population.

Ed Cowles recalled a shelling trip to British Honduras, now Belize, that he had made 37 years ago. His description of the trip was accompanied by slides of scenes and shells.

Walter Sage spoke of a collecting trip that he made earlier this year to several islands off western Panama. The group's professional guide was James Ernest, a Panamanian citizen, who has a house on Gobernadora Island, minus electricity and other "comforts". Collecting by dredging and snorkeling off Gobernadora, Cebaco, Isla Canal de Afuera, Isla Cana de Adentro, and Arenas de Quebro, they came back with a wealth of specimens, most preserved in alcohol. There were several well-filled jars of specimens on display.

The door prizes were: Opeatostoma pseudodon, won by Pauline Czepulkowski; "The All Color Book of Shells," by J. M. Clayton, won by Nick Katsaras; "The Curious Mollusks," by Marie M. Jenkins, won by Al Scarpetti; "Sea Shells and How to Identify and Collect Them," won by David Epstein; and "Florida Marine Shells," by C. N. & V. R. Vilas, won by Milton Werner.

MY SHELL COLLECTION by Allen Aigen

I have been shell shocked since I was about 14 years old and living in Far Rockaway for the summer. I made a fair collection of mostly beach shells and identified them with Percy Morris's "Field Guide" (which was out of date but is still being sold). I continued collecting local marine shells, on and off until I left New York for the University of Illinois. There I learned systematic paleontology (the naming and classification of fossils). My Master's thesis was on a Mississippian gastropod fauna (about 330 million years old) from a limestone outcropping in Missouri. I learned to deal with unusual, poorly preserved, often tiny, and often undescribed material, and to collect everything from one locality. I also incidentally acquired a small hoard of Bahamian material, and a small number of mostly tiny gastropods from mostly extinct families.

I next collected a suite of shallow water shells from a month's work in the Florida Keys. It wasn't until after 1974 that I got a chance to catalog all this, however. (I use spiral notebooks for recording data). By that time I had acquired an old, flat map file, many small cardboard boxes, and lots of small covered plastic boxes (mostly 1" x 1", 1" x 2", and 2" x 2"). With space always at a premium, I keep my shells in the smallest container that fits, with a label across the bottom of the box (very neatly written to fit in tiny boxes). Numbers get marked on shells (with a technical fountain pen) only if in an open tray.

Since that time I started collecting marine, land and freshwater shells from wherever I was (New York, Florida, Israel, Utah....). I decided that bivalves take up too much space but I kept the pectens for esthetic reasons. I have examples of all the living molluscan classes except aplacophorans. (I cheat, the monoplacophorans are fossils.)

Starting in 1988 I've collected from the bargain table at the New York Shell Club auctions. Included in my finds were beautiful (and cheap!) material from Veronica Johns's shell shop, as well as a very wide variety of material recycled from old collections, some donated to the American Museum and passed along to NYSC - the museum routinely discards specimens with little or no locality data as "better" specimens are acquired. This greatly expanded my collection which is again overcrowding the space allotted.

I now have a large microfilm chest and two high bureaus, plus a scattering of oversize shells. Except for the microfilm drawers with built-in partitions, I place the shell boxes into variously sized trays (by family, genus, or whatever fits) and keep the trays in systematic order in the drawers. This allows me to pull out a group for examination without handling the entire drawer. I have a work desk and a small shell library at hand also. (Luckily, I have a small spare room to fill.) [We should all be so fortunate - ws]

I never, however, have enough books to identify my shells. Microspecies are especially difficult, and many end up with only questionable generic designations. I can collect more shells in a couple of days than I can process in a year - I probably will never quite catch up. [I know the feeling well - ws]

I find Kay Vaught's "A Classification of the Living Mollusca" to be indispensible for arranging my very diverse collection in a modern scientific order. (Most books separate marine, land, and freshwater mollusks regardless of their evolutionary relationships.) I hope to see her update with fossils included. [She is at present working on an update which will include fossil genera and families- we at AMNH have been helping her with references - ws]. I integrate fossils now, but it is a struggle. Separation tends to be arbitrary, and reduces information that can be gleaned from a well-organized collection.

I am, perhaps, an atypical collector in that I rarely buy from dealers (except at the couple of shows I've attended), and I appreciate shells that are far from being "collectors items". But would like to read about other collectors, even if you feel your collection is "ordinary".

Ed. Note - We thank Allen for this account of his collection and urge more of you to send in similar articles. I think we all enjoy knowing more about our fellow NYSC members and their collections. Read below for another account - ws.

HOW I BECAME A SHELL COLLECTOR by Eli Horowitz

When I was a child, we used to vacation at the beach. My father, who was a teacher, interested me in nature and helped me to make a shell collection. My first shell was a Strombus gigas, which originally served as a flower pot. Although the plant is long since gone, I have the shell to this very day!

At the City University I majored in Biology and became a science teacher. I eventually discovered McArthur's Shell Shop. Inside sat old Mr. Braun, a kindly gentleman who let me browse as much as I wished. Periodically I would visit this store and found many "treasures", which still call up fond memories. At that time too the American Museum sold shells and fossils. Alice Gray and Dr. Libbie Hyman took me "under their wings" and encouraged my interest in invertebrates. I purchased Julia Rogers's "The Shell Book" and Walter Webb's "Handbook" (which was filled with curious lore and good on land snails.)

For many years I resided in the Middle East, and especially enjoyed visiting the coral reefs off Eilat, Israel, on the Red Sea. The local aquarium also had a shell shop, where American shells would sometimes turn up, such as our old friend, the sinistral Busycon contrarium (sold there as a great curiosity!)

Returning in 1985 to the USA with my wife Levanna (also an avid shell collector), it was my good fortune to be accepted as a volunteer in the mollusk department of the American Museum under the auspices of Walter Sage and Dr. Emerson. I also joined the New York Shell Club and made many friends. Truly, there is no substitute for working with many shells, both common and rare, and their variations, as has been possible at the Museum. This exposure is worth more than any book or lecture.

My favorite families are the archeogastropods (Haliotis, trochids, turbos, etc.), strombs, cowries, melongenids, ranellids, bursids, and muricids.

My greatest rarities are Pleurotomaria hirasei, Lambis violacea, Cypraea guttata, Harpa costata, Conus cedonulli, and Conus gloriamaris. If you collect shells long enough, your idea of what is a beautiful shell will enlarge and you will eventually realize that all shells are beautiful!

You have read elsewhere in this issue that the New York Shell Club will hold its annual auction/social meeting on Sunday, May 9. We will again, due to the generosity of Dorothy Jensen, meet at her Broadway Dance Studio, Astoria, Queens. We are in the process of assembling shells and related items for the auction and bargain table, and hope you ALL will find something to donate. We have already received shells and books from Sol Weiss, Victor Wee, Dr. Walter Jacobs, Richard Goldberg, Henry Gordon, Bob & Dottie Janowsky, and Sue Hobbs. We need your donation by the March 14th meeting, so that we can prepare the items and make up the auction list, which will be mailed to you before the great day arrives. Please bring materials to Walter Sage at the March meeting or send them to Sol Weiss, 2562 Ramona Street, East Meadow, NY 11554. All items will be acknowledged on the auction list and in the June issue of our NOTES. Please help also with refreshments and bring lots of cash - Thanks. ws

CONUS GEOGRAPHUS VICTIM by Milton East, Exmouth, W. A.

Milton East - age 59 8/12 years. Non smoker/drinker. fit and healthy. Feb. 1st, 1988. Milton and wife Aileen were diving on hookah in 50 feet of water in Lighthouse Bay, 2 km west of Mildura wreck, NW Cape, Exmouth, West Australia.

At 1100 hours I found two live Conus geographus, which I put into a mesh bag and hung on my lead belt above my right hip.

At 1200 hours I felt a very sharp pain in my right buttock, like a red hot needle. It made me jump and for a second I thought that a sea snake had bitten me - then I realized it was a cone shell sting. Signalling Aileen what had happened, she took the bag from my belt and I swam over to free the anchor from the ledge and we both headed up.

1202 hours - The sting felt like a bee sting and I was feeling a bit disoriented. My legs were starting to feel heavy, as though they were paralyzed.

1202 hours - got into the dinghy OK. By this time my heart seemed to be having palpitations, racing and thumping a lot - I also had trouble getting enough air, having to take short, sharp breaths. The sting looked reddish, like a bee sting, all around the point of contact. Aileen had to help me get the vest, belt and gear off as I lost concentration - she kept telling me to "breathe deeply".

1204 hours - after taking off stretch pants, Aileen found the barb hooked in the wet suit. Removing the wet suit and bathers, we found the puncture mark to be just a tiny speck, which quickly swelled to the size of a 2 cent piece.

1205 hours - inspection for the barb revealed nothing, but Aileen sucked the spot in case venom was still on the skin. In moments the soreness spread to the surrounding area, and my legs felt paralysis coming into them.

1210 hours - I started the outboard motor and headed back to shore at Bills Way. A dazed feeling lingered but my heartbeat had settled down again.

1235 hours - arrived at the boat ramp at Bills and was feeling drowsy and had trouble getting my legs going. I had to concentrate on walking and wobbled like I was drunk.

1305 hours - drove home OK. I had a shower and rang the hospital. The sting area was fairly sore, with slight swelling and was hot to the touch, reddish about 4" around the puncture.

1320 hours - arrived at hospital. I had blood pressure, pulse, lung capacity test and temperature taken. All this was repeated every 15 minutes for the first hour, then every half hour and I was advised to rest.

1700 hours - left the hospital. I ate normally, but felt more tired than usual.

2130 hours - went to bed but didn't sleep properly through the night.

Feb. 2, 0445 hours - got up and rang work to report that I would not come in.

Feb. 2, 1200 hours - had several hours good sleep. My legs felt stiff and heavy, and I was feeling drowsy all day.

Feb. 3, 0650 hours - got up and went to work, but felt drowsy all day, lacked concentration. My legs felt like I had run a marathon.

Feb. 4 - I found it hard to sleep on my sides as normal, due to a heavy feeling in my chest like indigestion, feeling comfortable only sleeping on my back. There was no trouble in the sting area, except for soreness in muscle there.

Feb. 5 - sleeping better but still drowsiness in the daytime.

Feb. 8 - sting area swelling and red lump appeared and became itchy.

Feb. 9 - sting area very red, itchy, and spreading to small lumps at outer edge of immediate area, about 4" from sting spot now very red and hot. The doctor prescribed an antibiotic in case of infection and cortisone cream to relieve the itchy rash.

Feb. 10 - itching area and rash now 7" x 4" - hot, itchy and aggravating. This was worse when I touched the area to rub on the aristocort cream - even with a very light touch it would flare up and get extremely itchy. Fortunately the flare-up didn't last long as it felt like acid had been poured on the spot. Dr. Knight prescribed phenargen to relieve this effect while I was sleeping.

Feb. 11 - sting area still 5", red, swollen and itchy. Daily visits to Dr.

Feb. 13 - sting and rash fading, swelling also going down.

Feb. 16 - sting patch faded back to normal with the spot where the barb went in had the skin peeling about 2" around the puncture mark, about where the most swelling occurred. Legs still feel a slight weariness.

Feb. 22 - dived again in the same area and depth - no problems!

Beginning with food poisoning from crayfish in the 1950s, I have also been poisoned from eating razor clams. As a skin diver, over the years I have been bitten, stung, or cut by many marine creatures. The worst effect have been from the following: old wife fish, blue bottle, boar fish spine, bristle worms, sea urchin (long spines), squirrel fish spines, cuttle fish bite, trigger fish spine, killer prawn blade, flat head spines, trigger fish bite, toad fish spines, porcupine fish spines, sea urchin (banded spines), anemone sting, jelly fish (type unknown), wasp fish, hydroids (three types), fire coral, surgeon fish blade, butterfly cod (2 types, mild effect), unicorn fish blade, cobbler fish spine. Sand flies of different coastal areas really affect me. I have also had many other stings from whatever is seasonal that I contact while swimming.

(Thanks to NYSC member Vincent Cusumano for sharing this account with us).

[In addition to getting a first-hand report of a cone sting, I wonder if there might be anything to the thought that this man had so many different kinds of venom in his system over the years that the cone venom might not have affected him as severely as it might have others. He surely must lead a charmed life, not to have suffered more severely from the Conus geographus venom. Perhaps being a nonsmoker/nondrinker may have had some effect as well] ws

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April meeting to feature panel discussion on "Dealing with Dealers"

The April 4 meeting of the New York Shell Club will feature a most unusual type of program - a panel discussion by members on how they have conducted business with shell dealers. Henry Gordon, who originated the idea, will serve as panel moderator, and introduce the participants. Al Scarpetti, who began by buying shells from the McArthur shop (later owned by Veronica Johns) will discuss his purchasing from current dealers. Nick Katsaras will talk about and show photos of dealers from the past. Walter Sage, who first purchased shells in 1963 as a private collector and now cares for the mollusk collection at the Museum, will comment on how he has bought shells over the years. These presentations will be followed by opportunity for the "audience" to ask questions. This should prove to be a most interesting presentation - come and see how some veteran collectors have "dealt with dealers", and have that question that is always asked, "Should I buy that specimen from that dealer" answered in detail. You will not want to miss this special event - come prepared to ask questions and get answers. Watch Nick Katsaras name names and show pictures - a must meeting!

A BRIEF HISTORY OF THE GENUS *VASUM*

SUE STEPHENS

The genus Vasum is a small group including only 15 living species worldwide and 23 fossil species. The fossil record is predominantly New World with a marked lack of information on Old World forms. A few Miocene forms are described from Europe after which there is a total blank until the Recent - and yet the genus must have been living somewhere because half of the Recent species are found in the huge Indo-Pacific region. The New World history, however, is well documented.

Adult Vasum shells are 1" - 5" in length. They are heavy, solid, sculptured with either long open spines (as in *V.* (*Altivasum*) *flindersi* (Verco, 1914), Recent from Australia and *V.* (*Hystrivasum*) *locklini* (Olsson and Harbison, 1953), Pleistocene fossil from Florida) or with blunt short knobs as in *V. caestus* (Broderip, 1833) both fossil and Recent from the west coast of America. Depending on species, the columnella has 3 to 5 plicae and a moderate to short siphonal canal which is slightly curved to the left. In the long-spined species, the spines are open on their anterior faces. The operculum is horny, dark brown, unguiculate (claw or talon shaped), curved, narrow or pointed at the anterior end and rounded at the posterior. The periostracum varies; it ranges from thick, dark brown and matted to very thin, tan to translucent, again depending upon the species. (Since the operculum is chitonous it is never present in fossil specimens, unlike the calcitic opercula sometimes found in fossil turbos and naticas).

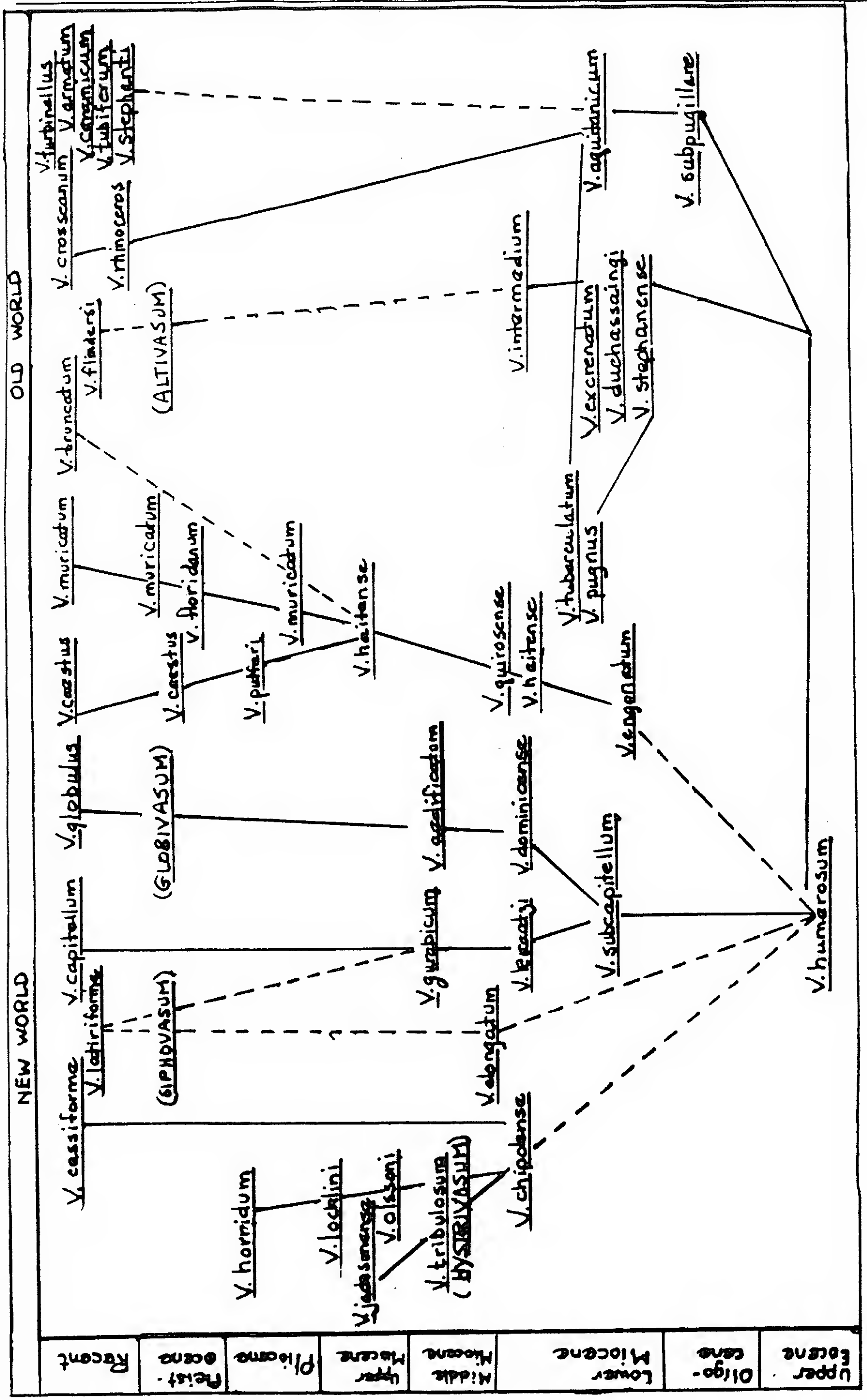
After a great deal of study, much of it conflicting and full of synonyms, R. T. Abbott in 1950 designated *V. turbinellus* (Röding, 1798) as the genotype of Vasum Röding, 1798.

The oldest known Vasum is found in the New World, *V. humerosum* Vaughn, 1896 from the Eocene of Louisiana. This form preceeded 3 variations in the New World, one of which has continued almost unchanged and is represented in the Recent by *V. capitellum* (Linné, 1758). Another branching in that line resulted in *V. globulum* (Lamark, 1816) and *V. (siphovasum) latiraforme* Rehder and Abbott, 1951. Next, in the lower Miocene of the Tampa Bay Limestone, comes *V. muricatum* (Born, 1778) in the Caribbean and *V. caestus* (Broderip, 1833) in the western Pacific. The third line, probably also Miocene in origin, is represented now by *V. cassiforme* (Kiener, 1841) and by extremely spinose forms in the subgenus Hystrivasum. This spinose group located from the upper Miocene to the end of the Pliocene when it died out. This subgenus is represented by the well known species *V. (H.) horridum* (Heilprin, 1887), *V.(H.) locklini* (Olsson and Harbison, 1953), and by the lesser known and much more uncommon *V. (H.) olssoni* E. H. Vokes, 1970 and *V. (H.) jacksonense* E. H. Vokes, 1970. The distinguishing feature which separates Hystrivasum from Vasum s.s. is the secondary row of spines just anterior to the suture, a unique form which gives the exceptionally spinose appearance to this subgenus.

In general the living species of vasum are shallow water or reef dwellers. R. T. Abbott reported (1959) that they are carnivores and feed on clams and worms. Recent adult

(Continued on Page 11)

PHYLOGENETIC ARRANGEMENT of THE SPECIES of VASUM



WORLDWIDE VASUM

Family **VASIDAE**
Subfamily **VASINAE** H. & A. Adams, 1853
Genus ***VASUM*** Röding, 1798
Subgenus ***VASUM s.s.***
Subgenus ***ALTIVASUM*** Hedley, 1914
Subgenus ***GLOBIVASUM*** Abbott, 1950
Subgenus ***SIPHOVASUM*** Rehder and Abbott, 1951
Subgenus ***HYSTRIVASUM*** Olsson and Petit, 1964

FOSSIL FORMS:

	LOCALE	AGE
VASUM s.s.		
caestus (Broderip, 1833)	California - W. Pacific	PLEISTOCENE
haitense (Sowerby, 1850)	Dominican Rep. to Florida	LOWER MIOCENE
aedificatum (Guppy, 1876)	Dominican Republic	MIDDLE MIOCENE
gurabicum Maury, 1917	Dominican Republic	MIDDLE MIOCENE
floridanum McGinty, 1940	Bermont formation, Florida	LOWER PLEISTOCENE UPPER PLIOCENE
elongatum E. H. Vokes, 1970	Chipola formation, Florida	LOWER MIOCENE
tribulosum E. H. Vokes, 1970	Chipola formation, Florida	LOWER MIOCENE
HYSTRIVASUM		
horridum (Heilprin, 1887)	Florida	PLIOCENE
locklini (Olsson & Harbison, 1953)	Florida	PLIOCENE
jacksonense E. H. Vokes, 1966	Florida	UPPER MIOCENE
olssoni E. H. Vokes, 1966	Florida	UPPER MIOCENE
schrinerae Hollister, 1971	Florida	PLIOCENE (These are **nomen dubium** and are considered to be very gerontic specimens of ***locklini*** and unnamed cross breeds.)
squamosum Hollister, 1971	Florida	
+ 3 others Hollister, 1971	Florida	

RECENT FORMS:

(Cont. on page 11

VASUM s.s.

capitellum (Linné, 1758)	Caribbean
ceramicum (Linné, 1758)	Indo-Pacific
turbinellus (Linné, 1758)	Indo-Pacific
muricatum (Born, 1778)	Florida - Caribbean
rhinoceros (Gmelin, 1791)	East Africa

VASUM s.s. (continued)

armatum (Broderip, 1833)	French Polynesia	
caestus (Broderip, 1833)	California - W. Pacific	(Fossil & Recent)
cassiforme (Kiener, 1841)	Brazil	
tubiferum (Anton, 1859)	Indo-Pacific	
crosseanum (Souverbie, 1875)	East Africa	
truncatum (Sowerby III, 1892)	South Africa	
stephanti Emerson and Sage, 1988	East Africa	

ALTIVASUM

flindersi (Verco, 1914)	Australia

GLOBIVASUM

globulus (Lamarck, 1816)	West Indies
globulus form *nuttingi* (Henderson, 1919)	West Indies

SIPHOVASUM

latiriforme Rehder and Abbott, 1951	Gulf of Mexico

* * * * * * * * * * *

(continued from Page 10)

specimens are usually heavy, rugged and spinose (with the exception of *V. (G.) globulus* and *V. (S.) latiriforme* which are much smaller than their ancestors). Except for the deep water forms of *V. (A.) flindersi* and *V. cassiforme*, most do not equal their fossil ancestors in either size or spinosity.

Obviously a small family with only 15 members extant, these diverse and handsome species are little known, seldom collected, and, to my knowledge have never been exhibited as a family until my own exhibit in 1986. Since that time, a new species, *V. stephanti* Emerson and Sage, 1988 has been named. I have been fortunate enough to acquire two paratypes of the *stephanti* for my collection plus two additional specimens which have beautiful, complete nuclear whorls (a rarity in itself since vasum generally seem to have most of the protoconch missing). I believe, based on my own diligent study, that I have also acquired a specimen of the very rare *Vasum crosseanum* (Souverbie, 1875). However, verification depends upon the ever-important protoconch which, in my specimen, is incomplete. If this specimen should turn out **not** to be *Vasum crosseanum*, then I have a new, unnamed species which would bring the world-wide total to 16 extant species. Either way, I really cannot lose.

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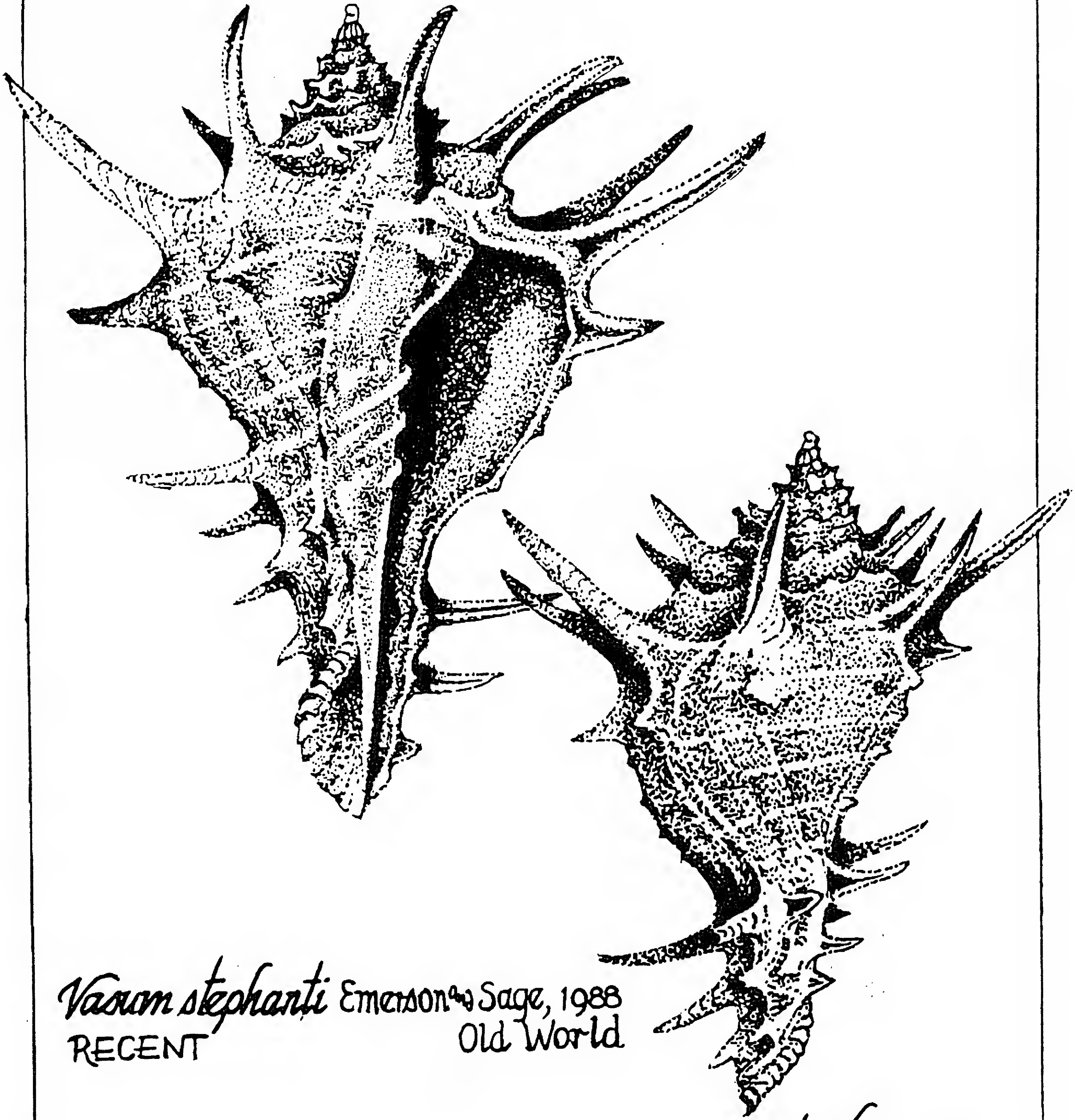
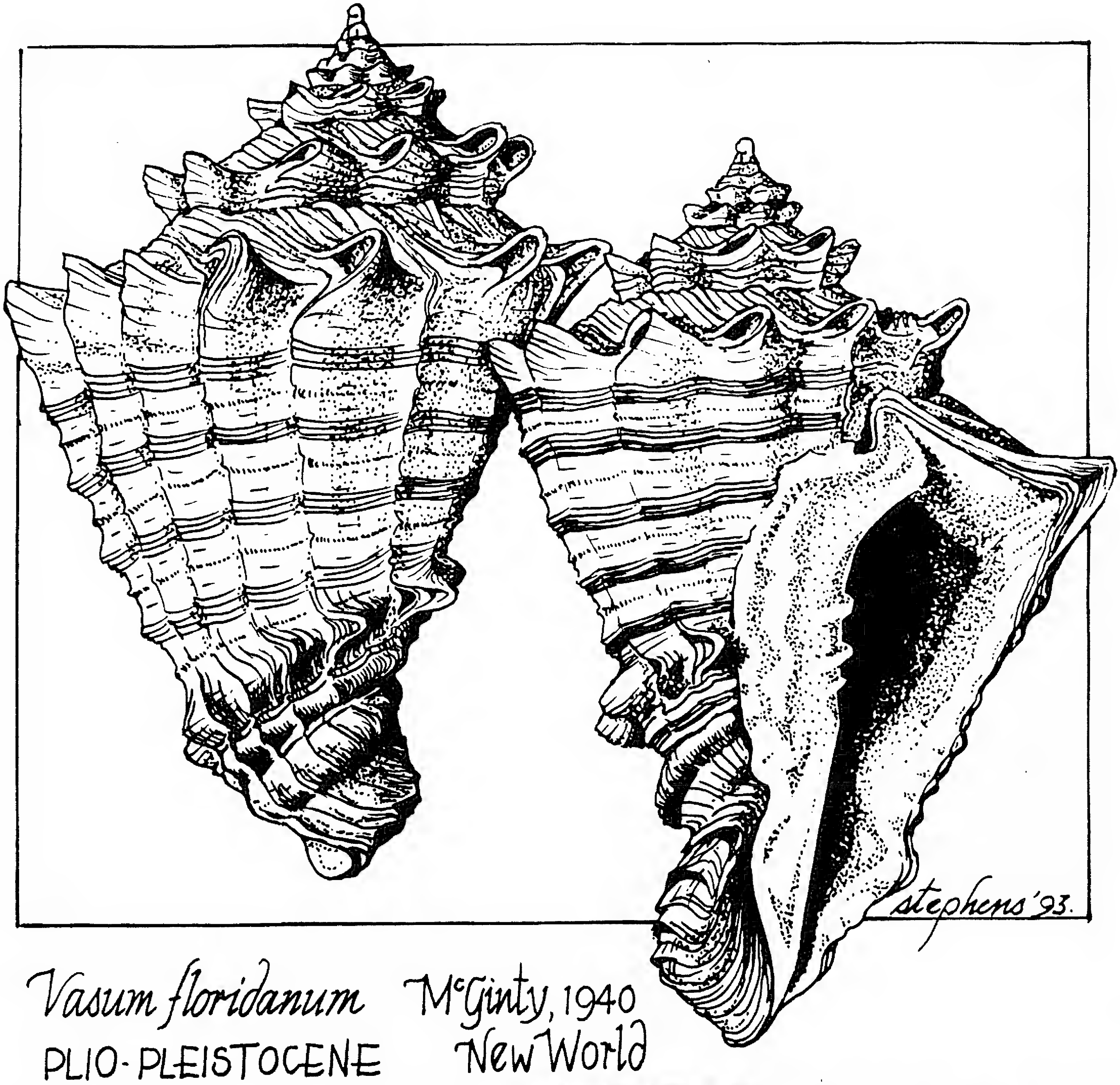
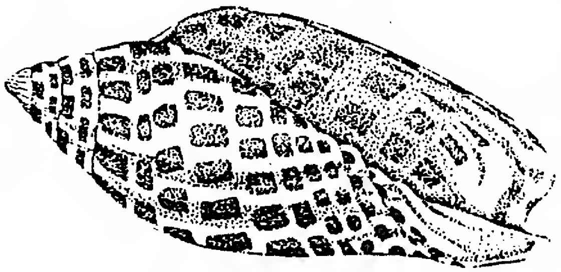


Vasum stephanti Emerson and Sage, 1988
RECENT
Old World

s. stephens, '93.


stephens '93.

Vasum floridanum McGinty, 1940
PLIO-PLEISTOCENE New World



The Junonia

THE SANIBEL-CAPTIVA SHELL CLUB, INC.
P.O. Box 355 Sanibel, FL 33957

FEBRUARY, 1993

FRONT: ***Vasum floridanum*** McGinty, 1940
V. floridanum is an upper Pleistocene-late Pliocene fossil. It is a "marker" fossil for the Bermont Formation. The type locality is Ortona Locks, Caloosahatchee River, Florida, a long-since overgrown, inaccessable, and unavailable location. An adult specimen is a large, heavy shell averaging 5" (128mm), with a somewhat elevated spire and a single row of from 8-11 large spines at the shoulder. The surface is sculptured with usually 5 pairs of alternately medium and fine spiral cords and 2 rows of basal spines with the top row always more prominent. The columella has 4 plaits with the uppermost being largest. The surface of the shell is covered with fine axial growth lines, the strongest of these emanating from each spine with many finer ones in between. *V. floridanum* is the northern cognate of *V. muricatum* (Born), the most common and wide spread species of Vasum in the western Atlantic which appears first in the upper Pleistocene. *V. floridanum* is a still-rare species known only from the type locality and a few Bermont Formation localities (as the original pits in DeSoto County).

BACK: ***V. stephanti*** Emerson and Sage, 1988.
This recent new species is deep water trawled off Cape Gardafui (Ras Asir), Somalia. Aside from the holotype and 10 paratypes, only a very few are in private collections. The shell is quite triangular in shape, has an elevated spire with a bulbous nucleus of 1 1/2 whorls followed by 7 postnuclear whorls. There are 3 well developed columellar plaits (as opposed to 4 or 5 in other species), a consistent off-white color with a white glazed aperture and parietal shield. The body whorl has a prominent row of 6-8 strong, curved to recurved, terminally open shoulder spines followed by a second row of much shorter spines.There are 5 main spiral cords with intervening faint spirals, then 2-3 basal rows of spines. The umbilicus is funnel-shaped and the periostracum is moderately thick and tannish brown in color. I have no personal observation of the opercula since the (bad) habit of the Russian trawling crews is to throw overboard the body with operculum when they clean their haul - a habit one hopes will soon be corrected.

In addition to the type locality (above), *V. stephanti* is known only in the Gulf of Aden off the Bari coast of Somalia.

Pages 8-15 of the March 1993 issue of NYSC Notes have been copied from the February issue of THE JUNONIA. Thanks to editors Margaret Thorsen and Sue Stephens for such excellent articles.

YOU REALLY SHOULD BE A MEMBER

Margaret Thorsen

Personally, I'm not a "joiner", but COA (Conchologists of America, Inc.) and PRI (Paleontological Research Institution) are two organizations I'm glad I did join. I think you should know something about them both.

COA was founded in 1972 by a group of shell collectors who saw the need for a national organization devoted to the interests of shell collectors - the beauty of shells, their scientific aspects and the collecting and preservation of mollusks. The quarterly publication, American Conchologist, is excellent, and the conventions are informative, fun, and provide a delightful week in which to meet other shellers. Dues are for the calendar year: $12.50 for an individual and $15 for a family. Make checks payable to Conchologists of America and mail to:

Bobbie Houchin
2644 Kings Highway
Louisville, KY 40205

PRI is an organization I have just recently joined, and I urge all of our avid fossilers to do likewise. It was founded in 1932 and houses one of the largest collections of invertebrate fossils in North America. Their educational outreach is most commendable and includes providing specimens and visiting lecturers to the primary and secondary schools of central New York, as well as serving as a resource for both undergraduate and graduate students at Cornell. Their publications are of the highest calibre and include Bulletins of American Paleontology, Palaeontographica Americana, and numerous special publications. The quarterly newsletter, which all members receive, is entitled American Paleontologist. It is the newsletter, plus several of their reprints, which attracted my attention. In addition to receiving the newsletter, members receive a one-third discount on all PRI publications. Membership dues are $20 per year.

For information on membership, publications, or any other PRI programs, contact the DIRECTOR:

Paleontological Research Institution
1259 Trumansburg Road
Ithaca, NY 14850

"RAMBLINGS" of an Enthusiastic Sheller

Vivienne Smith

Fascination of the world of Mollusca is tripled in enjoyment when one has found a favorite family. Each "new" species you discover is similar to opening a Christmas present - - very exciting!

From the very beginning of my collecting marine shells, the beauty of wentletraps drew my attention and interest. The difficulty in identifications presented a challenge to me which has not lessened over the past 20 years since my first shelling trip to the island of San Salvador. There, under a rock, I found my first wentletrap, *Epitonium gyroscala lamellosum* (Lamarck, 1822). On my second shelling trip to the island of Providenciales, I also found an *Epitonium gyroscala lamellosum* under a rock at low tide.

In 1979, when we moved to Florida because my husband and I just loved fishing, I discovered that I was really "hooked" on shelling; or, as my father described it, I had become a "shell-a-holic". Fishing, therefore, dropped from being my #1 hobby to my # 2 hobby.

I still love to fish; but once you eat one, it is gone, and a shell can last almost forever. Furthermore, you can enjoy any shell or all your shells as often as you like. You have only to open a cabinet or a drawer to enjoy your "treasures", to marvel at their beauty, to reminisce about the places you found them, the people you were with, and the circumstances surrounding your discovery of certain of your "treasures". The shells you find are never items you put away and forget about. This is especially true of specimens you have collected yourself. You take great pride in them, you enjoy showing them to others, and you take very good care of them.

My first help was Norman Paschall who alerted me to pertinent publications available to help me. He was also a great help to me in identifying my specimens. I felt that I had really accomplished something when I identified *Epitonium asperiscala gradatum* (Sowerby, 1844) which I had collected in sea wash at low tide on Tamarindo Beach, Costa Rica, in 1982. Norman confirmed my identification with a big "Congrats!" On the same trip, I found about 7 other species in the same area during the incoming tide.

A few years later, at a C.O.A. convention, I was introduced to Helen DuShane who invited my to see her Epitonidae collection. Through years of correspondence, this meeting developed into a very real and valued friendship. Helen patiently led me on to learn more about "Epis" and answered many, many questions for me. I would be remiss if I did not emphasize the many, many friends I have made because of my interest in shelling. It is anything but a lonely hobby. There is always another sheller who is ready to go to the beach, to go "to the pits", to sit and spend hours trying to identify a new find, or to just talk shells.

I found out one very important thing, which carried over from my years working as a nurse in surgery: "You are never finished learning!" And I must mention the 3 words that I learned from a very remarkable gentleman, the late Jerry Bijur, when he perceived that I was becoming very frustrated over identifying Epitonidae:

"Patience- - - patience - - - patience!"

(Having known Vivienne for several years and had great fun in her company on a trip to Panama in 1991, I can personally attest to her being an enthusiastic sheller. She has become a specialist in her favorite Epitoniidae and a great friend). ws

Robert J. L. Wagner (1905-1992)

Bob Wagner, well-known among conchologists as the senior editor of The Standard Catalog of Shells and recorder of the official World Size Records, died of a heart attack November 18, 1992 in Elizabethtown, PA, at the age of 87. For years he was active in the shell world in Philadelphia and southeast Florida, often serving as a scientific judge in various shell shows.

Robert Jacob Lewis Wagner was born on August 9, 1905 in Hazelton, PA, graduated from Hazelton High School and attended Penn State College in 1923. For years he was an engineering administrator with Bell Telephone Company of Philadelphia and it was during those years that he became a charter member, and later the President, of the Philadelphia Shell Club. In 1964 he and Tucker Abbott began the Standard Catalog of Shells, then known as Van Nostrand's Standard Catalog of Shells, and until his recent death kept the registering of World Size Records.

His first wife, Genevieve Duffy Wagner, a public school teacher, died in 1979. Bob moved to Marathon, Florida, and later to Miami. In 1990, he and his second wife, Fran(ces) E. Williams Wagner, a prominent artist and ceramic muralist originally from California, moved to a retirement community in Elizabethtown, PA.

Bob was an indefatigable worker with ability to handle massive details, so very necessary in his conchological publications. He corresponded with hundreds of people around the world, keeping measurements of over 3,000 species of marine shells. He wrote informative articles for many shell magazines and club newsletters, as well as giving many illustrated public lectures on shells. All during his life Bob kept abreast with modern technological developments and was constantly suggesting new approaches to shell collecting. On the day before his untimely death, Bob was entering new size records sent in from Thailand. He and his wife Fran, took many collecting trips together to the Bahamas and lower Caribbean.

Fran, still active in needlepoint projects and shells, will remain at their home at 2114 James Buchanan Drive, Elizabethtown, PA 17022-3101. The World Size Records will be continued for now by Dr. Abbott, P. O. Box 2255, Melbourne, FL 32902-2255. R. Tucker Abbott

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Publication Notice

(courtesy of Dr. R. Tucker Abbott)

The Edge of the Fossil Sea by Edward J. Petuch. Following the footsteps of Rachel Carson, Edward Petuch has painted a charming and authentic picture of the intriguing fossil past of southern Florida. Replete with over 30 pages of realistic sketches of Tertiary seas, the book also presents many sharp photographs of recently discovered conchological gems. Come join Ed in his adventures into the ancient depths of the Okeechobeean Sea and Lake Okeelanta of a million years ago. Learn of the reef life that now lies buried under Florida's modern highways near Miami, and how the Terror Birds and now extinct sea mammals sustained themselves on the abundant molluscan populations there.

If you've ever yearned to venture into today's gravel and shell pits in search of beautiful fossils, this book will lead you into the realm of the secrets of Florida's fossil shell collecting. Dr. R. Tucker Abbott, in his foreword to this book, says, "Our mysteries of the past are beginning to be clarified. The eventual unraveling of this story will delight us for generations to come."

This paperback book of 80 pages is publication No. 2 of the Bailey-Matthews Shell Museum on Sanibel Island. This contribution was financially supported by Albert & Mary Bridell of Sanibel. Copies may be ordered from the Shell Museum, P. O. Box 1580, Sanibel, FL 33957. Museum members receive a 20% discount. Copies are available for $14.00 postage paid; Florida residents add 84¢ tax.

Editorial Note: Those of you who subscribe to Hawaiian Shell News will have seen the article by Burgess and Sage in the November 1992 issue on cowries named after Burgess's 1985 book was published. Further commentary was printed in the February 1993 issue of HSN. These discussions are too long to print in these NOTES, but the item below complements those reports and definitively discusses "lumpers and splitters." It is a timely piece, so please read it. ws

What's All This About Genus Names?

"In most books on cowries the genus name is ***Cypraea***, but in **La Conchiglia** and the French magazines different genus names are used — ***Lyncina aurantium*** for ***Cypraea aurantium***, and ***Erosaria staphylaea*** for ***Cypraea staphylaea***, for example. Which names are correct?"

Dr. R.N. Kilburn of the Natal Museum at Pietermaritzburg, S.A., reponded to that question in the CSSA's **Strandloper** for December 1992:

"In a nutshell, the confusion between the two systems of nomenclature reflects the ancient conflict between 'splitters' and 'lumpers.' To generalize, splitters like genera that contain few species, whereas lumpers prefer a simpler classification of relatively large genera.

"'Genus splitting' has some practical value in large families where natural groupings have yet to be finalized and relationships are often hard to understand (for example, in the Turridae, the Pyramidellidae, and the Triphoridae). Conversely, it is of little value in small, relatively uniform groups.

"Unfortunately, although classification should strive to reflect true relationships as they occur in nature, personal judgement and bias will always influence results. Thus, lumpers are often established authorities who are reticent to change their long-entrenched opinions. Splitters often have little understanding of taxonomic principles or even of molluscs as biological entities.

"Most splitters, however, are mainly overspecialized; they have so immersed themselves in their chosen group of molluscs that insignificant differences in complexes of closely related species may be viewed as of major significance. Such were the Schilders whose studies of the Cypraeidae, conducted a few decades ago, led them to divide the single genus **Cypraea** into about 31 genera, each with a handful of species, mostly differing only in minor shell characters.

"Obviously, neither splitting nor lumping is likely to produce a scientifically balanced classification. The only objective test is whether proposed genera differ from one another in widely divergent, sharply defined and constant characters, preferably drawn from several different body systems — shell, radulas, reproductive organs, etc.

"Modern systematic theory enables some evaluation of characters (it is now accepted that 'primitive' characters, for example, are of no value in classification). Small or cryptic shell characters, however, have sometimes been shown actually to be significant in the light of anatomical research.

"In the case of the Cypraeidae it would seem that at last a scientific basis for a new classification is in the offing. Dr. E. Alison Kay of the University of Hawaii has been working on the living and fossil cowries for many years and is now confident that a number of valid genera can be recognized. Until her results are published, however, it would be wise to use only the name *Cypraea* in a broad sense."

We have received the following letter (it came here in early February - note the date on which it was written): anyone interested should write immediately. ws

Dear Shell Club Membership: December 18, 1992

I would like to sell my shell identification index cards from Sally Diana Kaicher. I have packs 1-31 - all are in perfect, like new condition. They are all filed in metal card file drawers and there are also many color "index cards" cut from Hawaiian Shell News from the 1970s. I wish to sell the entire lot, cards and file drawers, for $250.00. I will pay the shipping. I also have a lot of books and specimen shells that I would sell. If anyone is interested, let me know and I'll make and send lists of these. (805) 772-9544

Pat DeGarimore, Captain's Cargo, 560 Embarcadero, Morro Bay, CA 93442

The Conchologists of America (COA) [see the item on page 14, this issue] has published a magazine for shell collectors for many years. In 1992, an Index to the first 20 volumes of COA publications - this 36 page paper sells for $4.00. postage paid. Also issued in 1992 was a History of the first 20 years of COA, 1972-1991. This 16 page paper sells for $2.00 postage paid. There are still a few of the 1992 T-shirts available at $12.00 postage paid, and there is a new enamelled pin available, as well as the last pins of the now disbanded South Carolina Shell Club, both available at $4.00, postage paid. Back issues of AMERICAN CONCHOLOGIST are also available. For information or to order, write Hank Foglino, COA Property Manager, 4 Trent Ct., Smithtown, NY 11787-1266. To join, write Bobbie Houchin, 2644 Kings Hwy., Louisville, KY 40205.

Journal of Shellfish Research, Vol. 11, No. 2, 489–505, 1992.

INTRODUCED MARINE AND ESTUARINE MOLLUSKS OF NORTH AMERICA: AN END-OF-THE-20TH-CENTURY PERSPECTIVE

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ABSTRACT A review of the introduced marine and estuarine (brackish water) bivalves and prosobranch and pulmonate gastropods of the Atlantic, Gulf and Pacific coasts of North America reveals an established fauna of 36 non-indigenous species. Sixteen species are native to temperate or tropical coasts of North America, and have been transported to regions of the continent where they did not occur in historical time; the remaining 20 species are from Europe, the Mediterranean, South America, the Indo-Pacific, and the northwestern Pacific. The movement of Pacific (Japanese) and Atlantic commercial oysters to the Pacific coast, and ship fouling, boring, and ballast water releases, have been the primary human-mediated dispersal mechanisms. Regional patterns are striking: 30 species are established on the Pacific coast, 8 on the Atlantic coast, and 1 on the Gulf coast (three species occur on both coasts); 19 (63%) of the Pacific species occur in San Francisco Bay alone. These patterns may be linked to a combination of human-mediated dispersal mechanisms and regional geological-biological Pleistocene history: at least 27 species of Japanese and Atlantic coast mollusks were introduced to the American Pacific coast by the oyster industry, in large part into geologically young regions with low native molluscan diversity. With the exception of a few species, there is little experimental elucidation of the ecological impact of the introduced marine mollusks in North America. Negative effects by introduced gastropods on native gastropods have been demonstrated on both the Atlantic and Pacific coasts; for one species, the Atlantic pulmonate marsh snail *Ovatella* on the Pacific coast, experimental evidence suggests that its establishment did not arise at the expense of native species. No introduced marine mollusk in North America has had a greater ecological impact than the periwinkle *Littorina littorea*, which colonized the Atlantic coast from Nova Scotia to New Jersey in the 30 year period between 1860 and 1890, and subsequently altered the diversity, abundance, and distribution, of many animal and plant species on rocky as well as soft bottom shores. Future marine invasions, through ballast water release and perhaps through aquaculture activities, can be expected with confidence.

KEY WORDS: mollusks, introductions, invasions, nonindigenous, exotics

INTRODUCTION

> "A good deal of chess play has also been done with clams. . . ."
>
> —Charles S. Elton (1958)

At the close of the 20th century we are witnessing rapidly growing interest in the phenomenon of biological invasions of coastal waters. As a result of an increasing number of unintentional invasions of marine organisms due to the release of ballast water through international shipping activities, and of increasing pursuit of the intentional use and release of marine organisms for mariculture purposes and for open sea fisheries enhancement, concern is growing relative to the potential ecological, genetic, economic, and social risks that may be associated with future invasions.

I review here the diversity, distribution, regional invasion patterns, and ecological impacts of the introduced marine and estuarine (brackish water) bivalves and prosobranch and pulmonate gastropods of the Atlantic, Gulf, and Pacific coasts of North America. Introduced species (exotic, non-indigenous, alien, or invader species) are those taxa transported by human activity to regions where they did not exist in historical time (Carlton 1987). While there has been no previous continent-wide review of the introduced mollusks, Quayle (1964), Hanna (1966) and Carlton (1975, 1979a, 1979b) have provided regional lists and treatments for the Pacific coast. Abbott (1974), Bernard (1983) and Turgeon (1988) list many of the species discussed here. I include all species which have been recorded as free-living outside of mariculture operations. One species, the Japanese sea scallop *Patinopecten yessoensis*, is included because of its current mariculture use and potential to become naturally established. I have excluded opisthobranch mollusks (sacoglossans, nudibranchs and pyramidellids), pending a global and/or continental review of the candidate species. There are no introduced polyplacophorans (chitons) or scaphopods (tusk shells) in North America. I also exclude most records of single specimens of living mollusks whose anomalous presence outside their recorded ranges appears to be due to discarding through hobby (aquarium) or fishing activities.

Mechanisms of introduction of non-indigenous marine organisms to North American waters have been reviewed by Carlton (1985, 1987, 1989, 1992a). The most important human activities have been or are the following: (1) the transportation of organisms on the outside (fouling species) or on the inside (boring species) of ships, (2) the transportation of organisms inside vessels in solid ballast, such as rocks, sand, and detritus, (3) the movement of oysters, and the concomitant movement of organisms on the oyster shells or in associated sediments and detritus, (4) the intentional release of species for fisheries purposes, and (5) the release of larvae, juveniles, or adults of marine organisms in the ballast water of coastal, transoceanic, and interoceanic vessels. I review below the relative importance of each of these mechanisms to the established introduced mollusks in North America.

METHODS

Field, museum, and literature work from 1962 to 1979 are summarized by Carlton (1979a). Field work during that period was conducted from Vancouver Island to southern California; 18 museums or private collections on the west and east coasts of the United States and Canada were studied. From 1979 to 1992 field work was conducted from Newfoundland to Virginia, as well as on the Pacific coast, and museum collections were revisited to examine additional species. Throughout both periods I corresponded with malacologists and other biologists and undertook continual literature reviews. The records and dates recorded here are thus based upon field work, museum collections, personal communications, and the literature, and form the basis of a monograph now in preparation. I present here an abstract of this work.

RESULTS

Regional Patterns of Invasion

Table 1 is a comprehensive synthesis of the introduced marine and estuarine mollusks reported since the early 19th century in North America. The introduced mollusks can be placed into 4 categories (Table 2): established (naturally reproducing populations are known), establishment not certain (no recent records, but the species may still be present), not established (not found in recent surveys or, if present, naturally reproducing populations are not known), and cryptogenic (Carlton 1987; status as introduced or native is not known).

Thirty-six species of non-indigenous marine and estuarine mollusks are established on the Pacific, Atlantic, and Gulf coasts of North America (Table 3). Sixteen species are native to temperate or tropical coasts of North America, and have been transported to regions of the continent where they did not occur in historical time. Thus, 14 species (Table 2) native to the Atlantic coast have been transported to the Pacific coast (Table 3 indicates 15 species on this route; this includes the European *Ovatella*, established on the American Atlantic coast). At least 3 species (*Rangia cuneata, Mytilopsis leucophaeata* and *Teredo bartschi*) have been transported from their apparently native southern ranges to more northern localities (shown in Table 3 as 1 species from the Gulf of Mexico and 2 species from the northwest Atlantic, respectively). The remaining 20 species include 4 from Europe, 1 questionably from Europe (the shipworm *Teredo navalis*), 1 from the Mediterranean (the mussel *Mytilus galloprovincialis*), 1 from South America (the mussel *Perna perna*), 1 questionably originating in the Indo-Pacific (the shipworm *Lyrodus pedicellatus*), and 12 from the northwestern Pacific.

Four species (Table 2) are questionably established; field work has not been focused on locating these species in recent years, and they may still be present. Seven species have not become regionally established: the Atlantic periwinkles *Littorina littorea* and *Tectarius muricatus*, once found living in California and the Gulf of California respectively; the European snail *Truncatella subcylindrica*, found in 1880 to be common at Newport, Rhode Island; the Asian clam *Laternula limicola*, found over a period of several years in Coos Bay, Oregon in the 1960s; the European oyster *Ostrea edulis*, widely released on the American Pacific coast, and the South American mytilid *Mytella charruana* which appeared in numbers in Jacksonville, Florida in 1986. Of these, *Littorina littorea* and *Ostrea edulis* have become established on the Atlantic coast. The Japanese sea scallop *Patinopecten yessoensis* while present in mariculture operations in British Columbia has not been reported in natural sets.

Cryptogenic species include (Table 1) the pulmonate limpet *Siphonaria pectinata* and the shipworm *Teredo navalis*. Nineteenth century or earlier shipping has been implicated in creating the modern distributions of both species, but details of their historical biogeography in the north Atlantic Ocean remain uninvestigated.

Regional patterns (Table 3) are striking: 30 species are established on the Pacific coast, 8 on the Atlantic coast, and 1 on the Gulf coast (3 species, the snail *Ovatella*, the clam *Corbicula*, and the shipworm *Teredo bartschi* occur on both the Atlantic and Pacific coasts). Most (27 species) of the introduced mollusks on the Pacific coast originate either from Asia or the Atlantic coast of North America. Of the Pacific species, 5 are recorded from only 1 locality: the Atlantic whelk *Busycotypus* and the Asian clam *Potamocorbula* occur only in San Francisco Bay, the Atlantic clam *Mercenaria* occurs only in Colorado Lagoon, Alamitos Bay, the Atlantic oyster *Crassostrea virginica* now survives only in the Serpentine and Nicomekl Rivers of the Boundary Bay region, British Columbia, and the shipworm *Lyrodus takanoshimensis* has been reported only from Ladysmith Harbor, British Columbia. I do not include here the clam *Macoma "balthica,"* whose San Francisco Bay population appears to arise from an Atlantic coast stock, as this genotype may in fact be widespread in central California embayments.

Four species are restricted to the Pacific Northwest (Washington and British Columbia): the Japanese snails *Cecina manchurica* and *Nassarius fraterculus*, the Japanese clam *Trapezium liratum* and the Pacific oyster (*Crassostrea gigas* (which rarely reproduces south of Willapa Bay, WA). Two additional species reported only from British Columbia are the questionably established *Clanculus ater* and *Sabia conica*. Four Atlantic species are well established in a few restricted localities: the slipper limpet *Crepidula convexa* occurs only in San Francisco and Boundary Bays (newly recognized in British Columbia by Robert Forsyth); the mudsnail *Ilyanassa obsoleta* occurs only in San Francisco, Willapa, and Boundary Bays; the angelwing clam *Petricola pholadiformis* occurs only in San Francisco, Newport, and Boundary Bays, and the gem clam *Gemma gemma* is restricted to 5 bays in central California (Bodega Harbor (not Bodega Bay), Tomales Bay, Bolinas Lagoon, San Francisco Bay, and Elkhorn Slough). Seven oyster-associated introductions occur in British Columbia/Washington and in California, but for reasons that remain unclear do not occur "naturally" in Oregon bays and estuaries: these are the Japanese snail *Batillaria attramentaria* and the Atlantic gastropods *Ilyanassa obsoleta, Crepidula convexa, C. fornicata, C. plana*, and *Urosalpinx cinerea;* the fifth species, the Japanese clam *Venerupis philippinarum*, occurs in Netarts Bay, Oregon only by virtue of an intensive planting program (the only bay in Oregon where the Japanese oyster drill *Ceratostoma inornatum* is also established).

The Asian clam *Theora lubrica* and the Atlantic mussel *Geukensia demissa* occur disjunctly in San Francisco Bay and again in southern California bays. The abundant and widespread freshwater clam *Corbicula fluminea* appears occasionally in estuarine situations in Oregon and California. The tropical Atlantic shipworm *Teredo bartschi* has been introduced to at least 2 sites in western Mexico, and is probably more widespread than these records indicate.

Of the 30 introduced species on the Pacific coast, then, only 12 are relatively widespread. These are the gastropods *Crepidula fornicata, Crepidula plana, Batillaria attramentaria, Urosalpinx cinerea, Ceratostoma inornatum*, and *Ovatella myosotis*, and the bivalves *Mytilus galloprovincialis, Musculista senhousia, Venerupis philippinarum, Myra arenaria, Teredo navalis*, and *Lyrodus pedicellatus*.

TABLE 1.

Introduced marine and estuarine mollusks of North America (exclusive of opisthobranch gastropods). *Common names* after Turgeon 1988; **(*) species listed without common name in Turgeon 1988; (+)** species not listed in Turgeon 1988.

Species	NATIVE TO/Introduced To (date of collection)/MECHANISM (M) (see keys, below)	References and Remarks
GASTROPODA: Prosobranchia		
Trochidae		
Clanculus ater Pilsbry, 1911 (+topsnail)	NW PACIFIC/NE Pacific: BC: Queen Charlotte Sound (1964). M: BW?	Clarke, 1972. Not reported since 1964; status not known.
Pomatiopsidae		
Cecina manchurica A. Adams, 1861 (+Manchurian cecina)	NW PACIFIC/NE Pacific: BC (date?); WA: Whatcom Co. (1961); Willapa Bay (1963). M: COI	Morrison, 1963a, Duggan, 1963, Carlton, 1979a, Kozloff and Price, 1987:210. High intertidal, common, co-occurring with *Ovatella myosotis*, found by digging down inside piles of old oyster shells in damp, rich organic debris (Willapa Bay, 1977, JTC), a microhabitat similar to the one in its native Japan (Davis, 1979:117). Also at base of salt marsh plant *Salicornia*.
Littorinidae		
Littorina littorea (Linnaeus, 1758) (common periwinkle)	NE ATLANTIC/NW Atlantic: (<1840) Canada to VA/NW ATLANTIC/NE Pacific: see remarks. M: Atlantic: SB or IR; Pacific: DA	Carlton, 1982, Carlton et al. 1982, Vermeij, 1982a,b, Lubchenco, 1978, 1983, 1986, Brenchley, 1982, Brenchley and Carlton, 1983, Kemp and Bertness, 1984, Bertness, 1984, Blackstone, 1986, Yamada and Mansour, 1987, Petraitis, 1989. Became extinct in North America in precontact times; reestablished through either intentional release (for food) or accidentally with ballast rocks. Collected in San Francisco Bay in 1968–1970 and again in 1977 (Carlton, 1969, 1979a), but not found since despite sporadic searches throughout the bay (JTC, personal observations). Now one of the most predominant mollusks of the Atlantic rocky shore, and in some regions the marshes and mudflats, from Newfoundland to New Jersey.
Tectarius muricatus (Linnaeus, 1758) (beaded periwinkle)	NW ATLANTIC/Mexico: Gulf of California (1986, 1988). M: ?	Bishop, 1992, Chaney, 1992. No records since 1988.
Truncatellidae		
Truncatella subcylindrica (Linnaeus, 1767) (+)	NE ATLANTIC/NW Atlantic: RI: Newport (1880). M: SB?	Burch (1962) is the most recent to repeat this early record of Verrill (1880), who found this species to be common; it has not been collected since.
Potamididae		
Batillaria attramentaria (Sowerby, 1855) (=*Batillaria zonalis* auctt.) (Japanese false cerith)	NW PACIFIC/NE Pacific: BC (1959) to WA (1920s), but not Grays Harbor or Willapa Bay; CA: Tomales Bay (1941); Monterey Bay: Elkhorn Slough (1951). M: COI	Hanna, 1966, MacDonald, 1969a, 1969b, Whitlatch, 1974, Carlton, 1979a, Whitlatch and Obrebski, 1980, Yamada, 1982. Abundant locally on mudflats.
Hipponicidae		
Sabia conica (Schumacher, 1817) (*hoofsnail)	NW PACIFIC/NE Pacific: BC: Queen Charlotte Sound: Table Island (1940); Vancouver Island (1963). M: BW?	Cowan, 1974, Carlton, 1979a, Kay, 1979. Current status not known.
Calyptraeidae		
Crepidula convexa Say, 1822 (convex slippersnail)	NW ATLANTIC/NE Pacific: BC: Boundary Bay (R. Forsyth, personal communication, 1991); CA: San Francisco Bay (1898); M: COI	Hanna, 1966, Carlton and Roth, 1975, Carlton, 1979a. Very common on snail shells on mudflats along shores of San Francisco Bay.

continued on next page

TABLE 1.

continued

Species	NATIVE TO/Introduced To (date of collection)/MECHANISM (M) (see keys, below)	References and Remarks
Crepidula fornicata (Linnaeus, 1758) (common Atlantic slippersnail)	NW ATLANTIC/NE Pacific: WA: Puget Sound (1905?); Grays Harbor (1970s); Willapa Bay (1937); CA: Humboldt Bay (S. Larned, collector, 1989); Tomales Bay?; San Francisco Bay (1898). M: COI	Hanna, 1966, Carlton, 1979a
Crepidula plana Say, 1822 (eastern white slippersnail)	NW ATLANTIC/NE Pacific: WA?: Puget Sound?; Willapa Bay (1937); CA: San Francisco Bay (1901). M: COI	Carlton, 1979a, Wicksten, 1978 (as *Crepidula perforans*)
Muricidae		
Ceratostoma inornatum (Recluz, 1851) (=*Ocenebra japonica* (Dunker, 1860)) (+Japanese oyster drill)	NW PACIFIC/NE PACIFIC: BC (1931); WA: south to Puget Sound (1924); Willapa Bay (present populations since 1960s?); OR: Netarts Bay (1930–34); CA: Tomales Bay (1941); Morro Bay?; M: COI.	Chew, 1960, Hanna, 1966, Squire, 1973, Radwin and D'Attilio, 1976, Carlton, 1979a. Locally common on oyster beds in the Pacific Northwest.
Urosalpinx cinerea (Say, 1822) (Atlantic oyster drill)	NW ATLANTIC/NE Pacific (1890 and later years): BC: Boundary Bay; WA: Puget Sound and Willapa Bay; CA: Humboldt, San Francisco, Tomales, and Newport Bays. M: COI	Carlton, 1979a; populations last reported in Humboldt Bay in 1950 are still present (S. Larned, collector, 1989). Locally common on oysters and rocks.
Melongenidae		
Busycotypus canaliculatus (Linnaeus, 1758) (channeled whelk) Nassariidae	NW ATLANTIC/NE Pacific: CA: San Francisco Bay (1938). M: COI?	Stohler, 1962, Carlton, 1979a (who reviews evidence for retention of 1938 date).
Nassariidae		
Ilyanassa obsoleta (Say, 1822) (=*Nassarius obsoletus*) (eastern mudsnail)	NW ATLANTIC/NE Pacific: BC: Boundary Bay (1952); WA: Willapa Bay (1945); CA: San Francisco Bay (1907). M: COI	Hanna, 1966, Carlton, 1979a, Race, 1982 Astronomically abundant in San Francisco Bay.
Nassarius fraterculus (Dunker, 1860) (Japanese nassa)	NW PACIFIC/NE Pacific: BC: Boundary Bay (1959); WA: Puget Sound region (1960). M: COI	Hanna, 1966, Carlton, 1979a, Cernohorsky, 1984:184–185
Pulmonata		
Melampodidae		
Ovatella myosotis (Draparnaud, 1801) (=*Phytia setifer* (Cooper, 1872)) (*European ovatella)	NE ATLANTIC/NW Atlantic: Nova Scotia to West Indies; Bermuda; NW ATLANTIC/NE Pacific: BC: Boundary Bay (1965) to Mexico: Scammons Lagoon (1972). M: Atlantic: SB; Pacific: COI	Stimpson, 1851, Morrison, 1963a, Abbott, 1974, Carlton, 1979a, Berman and Carlton, 1991. Earliest Pacific coast record is 1871 (San Francisco Bay); earliest record on Atlantic coast is 1841 (Massachusetts). Very common in high salt marsh and drift habitats.
Siphonariidae		
Siphonaria pectinata (Linnaeus, 1758) (striped falselimpet)	MEDITERRANEAN?/NW Atlantic (19th century or earlier): FL to Mexico, Caribbean Cuba, and northern South America. M: S	Morrison, 1963b, 1972. Morrison believed this species to be introduced from the Mediterranean on ships R. T. Abbott (personal communication, 1990) concurs. G. Vermeij (personal communication, 1990) questions this conclusion based on habitat and broad Western Atlantic distribution. Cryptogenic (see text).
BIVALVIA		
Mytilidae		
Mytilus galloprovincialis Lamarck, 1819 (=*M. edulis* auctt). (+Mediterranean mussel)	MEDITERRANEAN/NE Pacific: Northern CA (date?) to southern CA (1880s?), Mexico M: S	McDonald and Koehn, 1988, Koehn, 1991, Seed, 1992. Late twentieth century distribution probably enhanced by ballast water transport as well as ship fouling. An abundant fouling mussel.

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TABLE 1.

continued

Species	NATIVE TO/Introduced To (date of collection)/MECHANISM (M) (see keys, below)	References and Remarks
Musculista senhousia (Benson, 1842)	NW PACIFIC/NE Pacific: BC: Boundary Bay (R. Forsyth, personal communication, 1991); Puget Sound (1959); northern CA: Bodega Harbor (1971) to Elkhorn Slough (1965), earliest record for Pacific coast is 1941 (San Francisco Bay); southern CA: Newport Bay (1977) to San Diego Bay (1976); Mexico: Papilote Bay, south of Ensenada (1970). M: Pacific NW, northern CA: COI; southern CA-Mexico: BW?	Hanna, 1966, Morton, 1974, Carlton, 1979a. Abundant locally in dense mats over soft bottoms.
Geukensia demissa (Dillwyn, 1817) (ribbed mussel)	NW ATLANTIC/NE Pacific: CA: San Francisco Bay (1894), southern CA: Alamitos (1957), Anaheim (1972) and Newport (1940) Bays, Bolsa Chica Lagoon, Orange Co. (M. Wicksten, personal communication, 1979). M: San Francisco Bay: COI; southern California: S?/COI?	Hanna, 1966, Carlton, 1979a, Sarver et al., 1992. Juvenile *Geukensia* occur in fouling on ships, suggesting a mechanism for intracoastal transport from San Francisco Bay to southern California. Abundant in marshes, mudflats, and at bases of retaining walls in San Francisco Bay.
Perna perna (Linnaeus, 1758) (+edible brown mussel)	EASTERN SOUTH AMERICA/Gulf of Mexico: TX: Port Aransas (1990) to Port Mansfield (1991). M: BW/S	Hicks and Tunnell, 1993. Also recorded from Namibia to Mozambique (Kennelly, 1969).
Mytella charruana (d'Orbigny, 1846) (+, charru mussel)	EASTERN SOUTH AMERICA/NW Atlantic: FL: Jacksonville (1986). M: BW?/S?	Lee, 1986. Appeared briefly in large numbers in seawater intake of power plant in 1986, but disappeared by 1987 (H. Lee, personal communication, 1992). Perhaps released in ballast water of oil tankers from Venezuela.
Pectinidae		
Patinopecten yessoensis (Jay, 1856) (+Japanese sea scallop)	NW PACIFIC/NE Pacific: BC (1984–85), see remarks. M: IR	Raised in open sea aquaculture operations in BC (T. Carey, personal communication, 1990), but naturally reproducing populations not reported as of 1992.
Anomiidae		
Anomia chinensis Philippi, 1849 (=*Anomia lischkei* Dautzenberg and Fischer, 1907) (+Chinese jingle)	NW PACIFIC/NE Pacific: WA: Samish Bay (1924), Willapa Bay (1952); OR: Tillamook Bay (<1970s). M: COI	Carlton, 1979a. Current status not known. May be established (Hanna, 1966, Abbott, 1974), although Bernard (1983) believed otherwise.
Ostreidae		
Crassostrea gigas (Thunberg, 1793) (Pacific oyster)	NW PACIFIC/NE Pacific: Cultured from AK to Mexico; well established in BC, WA, sporadically reproducing south to CA: Tomales Bay. NW Atlantic: Sporadic plantings along Atlantic and Gulf coasts since 1930s. No established populations reported as of 1992, despite reported unauthorized private plantings of 1000s of bushels in Chesapeake Bay about 1988–90. M: IR.	Pacific: Galstoff, 1932, Barrett, 1963, Hanna, 1966, Quayle, 1969, Carlton, 1979a, Bourne, 1979, Chew, 1979, Ketchen et al. 1983, Foster, 1991:41. Atlantic: Galtsoff, 1932, Nelson, 1946; Turner, 1949, 1950, Mann, 1979, Mann et al. 1991. Experimental introductions in 1875 in WA (Barrett, 1963:48–49) were followed by regular attempts throughout the Pacific Northwest starting in 1902; CA plantings began in 1928.
Crassostrea virginica (Gmelin, 1791) (eastern oyster)	NW ATLANTIC/NE Pacific: BC: Boundary Bay only (since 1917–1918). Population in Willapa Bay WA is now extinct (K. Sayce, personal communication, 1990)	Elsey, 1933, Barrett, 1963, Hanna, 1966, Carlton, 1979a, Bourne, 1979. Plantings began in 1869–1870 in San Francisco Bay with completion of Transcontinental Railroad, and continued along entire Pacific coast in subsequent years.

to becontinued
June 1993 NOTES

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These NOTES are issued four times annually and are distributed by mail to all members of NEW YORK SHELL CLUB. Items and articles for publication in the NOTES should be sent to the Editor.

A limited number of back issues of the NOTES are available, $1.50 postpaid per copy.

Dues for all members are due and payable for the following year beginning each September, as follows; full membership $9.00 per year, family membership $11.00 per year, corresponding membership $7.00 per year in the United States; overseas membership $9.00 per year paid in U.S. currency.

The Treasurer-Membership Chairman should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS - 1992 - 1993

PLEASE NOTE: There are differences in date, day and time for our meetings from month to month (unlike previous years.) Consult the current edition of the NOTES for confirmation of date, day and time of each meeting.

DAY	DATE	TIME
SEPTEMBER	MEETING CANCELLED	
Sunday	October 11, 1992	2 P.M.
Sunday	November 1, 1992	3 P.M.
Sunday	December 6, 1992	2 P.M.
Sunday	January 3, 1993	2 P.M.
Sunday	February 14, 1993	2 P.M.
Sunday	March 14, 1993	2 P.M.
Sunday	April 4, 1993	2 P.M.
Sunday	May 9, 1993	Social/Auction
Sunday	June 13, 1993	2 P.M.

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79th Street, New York City, except our Social/Auction. On our meeting days, you may gain admission to the Museum without paying a fee by presenting your New York Shell Club membership card.

The NEW YORK SHELL CLUB meets on the Second Sunday of each month, September through June, in Room 319 of the American Museum of Natural History, New York City (unless otherwise advised). We have received confirmation of our regularly scheduled dates for each month in the 1993-94 club year, so we plan to see you all there on schedule. Please present your membership card from NYSC for admission to AMNH on meeting dates.

PROGRAM SCHEDULE

SUNDAY, June 13, 1993 at 2:00 p.m. - Sue Hobbs and Phil Dietz of Cape May, NJ will present a slide program - Shelling in Pacific Panama.

☆ SUNDAY, September 26, 1993 at 2:00 p. m. - Nick Katsaras, outstanding NYSC Historian, will continue his talk on dealers he has known that we were unable to complete at the April 4th meeting.

DETAILS at June meeting and in September NOTES

SUNDAY, October 10, 1993 at 2:00 p.m. - program to be announced.

SUNDAY, November 14, 1993 at 2:00 p.m. - program to be announced.

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We would like to invite all members who plan to attend the June meeting to meet for lunch at the American Museum Restaurant at 12:00 noon on June 13 to welcome Sue Hobbs and Phil Dietz. Please call President Al Scarpetti at (212) 929-7430.

At the June 13 meeting, Nominating Committee Chairman Milton Werner will present the slate of officers to be elected for the 1993-1994 club year. Please plan to be present at this meeting, so you can vote for these excellent candidates. We would like to see a great turnout, both for the election and the excellent slide program on the collecting trip to Panama. I have had the great fun and privilege to make two trips to Panama with James Ernest, in 1991 and again this year, and I would not trade these visits for the proverbial "pot of gold". Do join us in June.

HIGHLIGHTS OF RECENT MEETINGS

March 14, 1993: The scheduled meeting was cancelled due to the heaviest snowfall in this typist's memory. It is reported, however, that intrepid Queens residents Romuald Czepulkowski and David Epstein were able to reach the American Museum by subway, only to find that the meeting was correctly posted as cancelled.

APRIL 14, 1993: President Al Scarpetti expressed thanks to Walter Sage for much work well done on each issue of NYSC NOTES. [This appreciation is gratefully accepted, and I want to thank all who have contributed materials recently, especially Dorothy Raeihle, who despite many difficulties has continued to send items of interest and lend her expertise, always needed and appreciated - WS.] It was noted that the editors would like to continue receiving articles from members in which they recall how they became shell collectors.

Al reminded those in attendance that volunteers would be needed to prepare for and run the May auction/social meeting, and that donations of cakes, etc. would be appreciated. The needed responses were forthcoming.

The program was a panel presentation on the subject of dealing with shell dealers. Henry Gordon introduced the program and the other panelists. He then led off with observations on his own experiences in buying shells through dealers. He limits himself by never buying shells from dealers by mail. His main reason is that he would not have full confidence in the accuracy of locality data.

Nick Katsaras recalled some of the many dealers he has bought shells from. The first dealer he came to know was Lillias Cockerill, who moved to Sanibel in 1926. Nick also mentioned and commented on C. W. McArthur and Veronica Johns, Simon De Marco, Walter F. Webb and a volute specialist named Lowry whose first name he couldn't remember. His reminiscences on these and other dealers will continue at the September NYSC meeting and will appear in NYSC NOTES. [See herein - WS.]

Cone specialist Al Scarpetti had made a list of dealers he has found reliable, for copying by anyone interested. He noted that he had learned some hard lessons during his early dealings. He once sent $100 to an Asian dealer for a Conus gloriamaris, and got a specimen of Conus textile instead. There was no response from the dealer when Al questioned the identification. Al recommended checking out unknown dealers as thoroughly as possible, adding the observation that customers, too, can be unreasonable in their expectations. In a question and answer session, Al said that some dealers will send shells in advance of payment to customers they have come to consider responsible and reliable.

Walter Sage talked on the American Museum's relationships with dealers, from whom it buys only shells of special interest. On occasion he helps dealers to locate literature they need in order to make accurate identifications. Some dealers, he noted, remain flexible on specific names. Whenever possible, he recommended seeing the shell before buying. In the case of a foreign dealer, getting a photograph of the shell in question is a reasonable precaution.

Al Scarpetti expressed the feelings of all present when he thanked Henry Gordon for an excellent and most informative programs.

The door prizes were: an issue of AMERICAN CONCHOLOGIST magazine, won by Al Scarpetti; a copy of Dance's Sea Shells, won by Harvey Frajlich; a copy of A. Gordon Melvin's Gems of World Oceans, won by Nick Katsaras; a copy of Morris's Field Guide to Shells of the Atlantic and Gulf Coasts, won by Henry Gordon; Mitra picta, won by Milton Werner; Neritina communis, won by Irving Hoppenwasser; and Cymatium lignarium, won by Romuald Czepulkowski.

The results of the May auction/social will be reported at the June meeting and printed in the September NOTES. We thank all who contributed to its success.

1993 Summer and Fall Shell Shows and Meetings

June 21-25 American Malacological Union Annual Meeting
Cruise to Nassau and Freeport, Bahamas
Dr. Fred G. Thompson, President
The Florida Museum of Natural History
Museum Road, Gainesville, FL 32611 (904) 392-1721

June 27-July 1 Western Society of Malacologists Annual Meeting, San Diego, CA
Dr. Douglas Eernisse, University of Michigan
Museum of Zoology, Ann Arbor, MI 48109 (313) 747-2193

July 11-17 Conchologists of America Meeting, Panama City, FL
Linda & Jim Brunner, Chairmen
P. O. Box 8188, Southport, FL 32409-8188 (904) 265-5557

July 17-18 Keppel Bay Shell Show, Yeppoon, Queensland, Australia
Jean M. Offord, 277 McDougall Street
N. Rockhampton, Queensland 4701 AUSTRALIA (79) 283-509

July 24-Aug. 1 Oregon Shell Show, Portland, OR
Maxine Hale, Show Chairman
347 NE 136 Avenue, Portland, OR 97230 (503) 253-5379

July 31-Aug. 1 Townsville Shell Show, Townsville, Queensland, Australia
Von Vandenburg, 12 Lillipilli Street, Vincent 4814
Townsville, Queensland, AUSTRALIA (77) 75-6275

August 14-15 Pacific International Shell Show, Cairns, Queensland, Australia
Barbara Collins, House of 10,000 Shells
32-34 Abbott Street, Cairns, Queensla, AUSTRALIA (70) 51-3638

August 19-21 Jersey Cape Shell Show, Stone Harbor, NJ
Jersey Cape Shell Club
P. O. Box 124, Stone Harbor, NJ 08247 (609) 653-8017

September 18-19 Central Florida Shell Show, Orlando, FL
Larry Stiles, Show Chairman
1505 N. Carolwood Blvd, Fern Park, FL 32730 (407) 834-2176

September 18-19 International Shells & Fossil Bourse, Ottmarsheim, France
Michel Rioual
2 Rue des Vergers, 68490 Ottmarsheim, FRANCE 89-26-16-43

October 8-10 Annual German Shell Fair, Berlin, Germany
Klaus Passan
Ostseestr. 41, 0-1055 Berlin, GERMANY (40) 294-669

October 30 British Shell Collectors' Club Shell Show, London, England
Kevin Brown (81) 568-8333
12 Grainger Road, Isleworth, Middlesex TW7 6PQ ENGLAND

November 6-7 Philadelphia Shell Show, Philadelphia, PA
Al Schilling, Show Chairman
419 Linden Avenue, Glenside, PA 19038 (215) 886-5807

(The above listing was provided by Donald Dan, 2620 Lou Anne Court, W. Friendship, MD 21794 - phone (410) 442-1242 or 1942). We thank Don for supplying the data.

LET'S MAKE A FRIENDLY DEAL by Arthur Weil

(reprinted from Hawaiian Shell News, March 1993)

Unless you are rich, you are going to have to go out of the "self-collected" realm to get some of the shells that live in deep water or half a world away.

Of course, if you ARE very rich and you want, say, a *Conus gloriamaris*, you can just hire a boat, go to the Solomon Islands, and pick a few off the beach. Like most of us though, you'll find it more practical to trade and buy.

And what you are afraid of most is sending your money to some dealer and not getting what you expected in return. At shell shows you hear gossip of deals gone awry. Usually it is just talk. Most dealers are not only honest, they want to stay in business. It's not a terribly lucrative trade. (you see few rich shell dealers.) They are in the business because they are [or were] collectors themselves and this enables them to handle more shells than they could otherwise.

Write to request their lists of offerings. Usually it's free, although in these days of rising postage rates you may be asked to pay for the first list. It will tell you not only what shells the dealer offers, but their size, price, condition, where they were found, and the terms of sale. Usually a dealer will insist on cash the first time around. If all goes well, you have established credit.

RULE NO. 1: Inform yourself on shell prices. Ask other collectors. Some save shell catalogs and will lend you a few. That's why they saved them! Long-time collector/dealer Tom Rice of Port Gamble, Washington, who publishes Of Sea & Shore magazine when not opening and closing bridges, every year or so publishes a guide to current shell prices. It's regarded very highly and there's nothing like it.

Tom Rice isn't the only person who keeps an eye on sales lists. Many collectors and most dealers do, too, the latter to be sure they are playing in the same ball park as other dealers. Actually, the biggest mark-ups are on the most common species - those not really worth picking up, sorting, wrapping and mailing for what a knowledgeable collector would pay for them.

RULE NO. 2: Read the description carefully. Don't expect anything more than the seller offers - a three-inch specimen that was really described as 3 mm. Most dealers go by the HMS-International Shell Grading Standards, sometimes slightly modified. The standard means that a "Fine" shell won't be described as a "Gem" (although it may be called "Fine+". Know and use these HMS-ISGS.

RULE NO. 3: Go to the shell shows. Attendance is your best learning experience. Just the ideas you pick up about displaying your shells are worth the trip. [The annual COA convention is an especially worthwhile opportunity to see a number of dealers with the widest available selection of specimen shells for sale.] The addresses you will get from other people who collect what you collect are a rich bonus. And of course, you will see some spectacular shells, also.

You will want to meet the dealers who attend these shows and conventions. Rule of thumb - dealers who make the trip to out-of-town shows are probably pretty well-established and worth knowing. They undoubtedly will have many tempting specimens you didn't realize you wanted, so the best tip is to make a list in advance - and stick to it! But always be ready to expand your horizons.

Sometimes you can dicker a bit on prices, particularly if business has been slow. Even a $5 reduction in the price of a $50 shell leaves you feeling "Man, did I make a great deal that time!" [But be sure not to be greedy and lose out.]

Some dealers carry a world-wide selection; others specialize. For instance, you will meet or correspond with some who deal only in shells of the Panamic region or of the northern Pacific. I know South African, Red Sea and Philippine specialists. They tend to be pretty darned knowledgeable about their particular areas.

RULE NO. 4: Read up in advance. Some publications can help you in sizing up dealers. A copy of Tom Rice's recurring directory of the principal dealers, clubs and periodicals should be in your briefcase. The many books written by Dr. R. Tucker Abbott are extremely informative about the rarity and value of the shells you will be offered, although they are not catalogs or price lists. These two men have done the giant job of organizing shelling information for us beginners.

RULE NO. 5: Make your first deal a small one. See if what you get is what you think you should have received. If it is, you can with confidence order those expensive shells you really want for your collection. This is one of the most satisfying ways of collecting. For example, I have a pretty complete set of olives. The only species I've self-collected is Oliva sayana from South Carolina. My remaining olives came from dealers or in trade from other collectors. By the way, don't broadcast how much - or how little - you had to pay for your shells. No one wants to discover that you made a better deal than he did. Nor do you.

Finally, RULE NO. 6: Play fair with your dealer. If he extends credit, pay up on schedule. When you aren't satisfied with a deal (it does happen) explain why and give him a chance to make good. And if you find him satisfactory, tell your friends.

[Ed. note - we welcome your comments and additions to the above remarks. We all have had experiences with dealers that are worth sharing. We will print comments received - good or bad - with the reservation that we will edit anything received.]

A pertinent comment comes immediately to mind: If, for any reason whatsoever you are not satisfied with any shell you have received from a dealer or collector, do communicate with that party. If the situation is not resolved speedily, return the specimen in question PROMPTLY. Reliable individuals will take back any shell you are not satisfied with, no questions asked. Know the return policy of any dealer you are doing business with, and abide by that policy - do not hold onto shells for a longer period and then expect to be able to return the specimens. A good working relationship is based on trust - always treat the party with whom you are dealing with the same respect you expect - it's the ONLY WAY!! - WS.

More on Introduced Mollusks (from the Chesapeake Bay Journal, Oct. 1992)

(submitted by Jack Foehrenbach, via Dorothy Raeihle)

For the past year or so, scientists have been looking for evidence that zebra mussels are moving down the Susquehanna River toward the Chesapeake Bay. But recently, evidence has been found of another exotic invader - the Asiatic clam - moving up the Susquehanna from the Bay.

The Three Mile Island nuclear power plant near Harrisburg, Pennsylvania recently spent $50,000 to vacuum out the remains of a colony in its cooling towers that may have numbered about 4 million, the York Daily Record reported.

Earlier in 1992, a chemical was used to kill the clams, but the dead clams became buoyant and were pulled into the plant's condenser, restricting the flow of water. Officials said the clams did not cause a safety problem but did keep the plant from operating at peak efficiency.

The Asiatic clam, Corbicula fluminea, entered the Bay years ago and has posed a problem for utilities and water plants by clogging water intake pipes. They have been working their way up the Susquehanna in recent years.

Meanwhile, officials continue to look for signs that the zebra mussel, another exotic species found in the northern part of the Susquehanna in 1991, is making its way downstream. The worry is that large zebra mussel populations may pose even more of a problem than the clams.

There will be a major exhibit on the zebra mussel later this year here at AMNH.

Shell Dealers I Have Known, World-Wide
by Nick Katsaras

Lillias F. Cockerill - Sanibel resident from 1926: I have no picture, no memorabilia, and just about remember her. The photo I have, from "Friends Magazine", shows her and all types of shellers on a Sanibel beach, collecting shells. I met her on my first visit to Sanibel, back when there was no bridge, just a bus to the ferry landing and then the ferry to Sanibel. We looked around a while, then got back on the bus. What I remember most about this visit is the bus driver, saying "Let's go, the mosquitos had their lunch - our blood!" This was about 1950.

Crosby D. McArthur, a Manhattan dealer: I first met him, where else, Brentano's Book shop on Fifth Avenue. He was the first dealer I bough shells from - $34 worth! From Brentano's, he moved to 61st Street, close to Bloomingdale's on Lexington Ave. Then he moved to Third Avenue at 39th Street. Does anyone know what McArthur's cliam to fame was? He's the dealer who sold a Conus gloriamaris for $1,200 to well-known Florida dealer Simon DeMarco, about 1955. McArthur's shop was later taken over by our own Veronica Johns, who renamed the shop "Seashells Unlimited" and carried on the business until her death just a few years ago.

I knew McArthur very well and bought many shells from him, including a 3 1/4" Conus striatus with the outline of a camera on it. This shell was pictured in Ripley's Believe It or Not column in the New York Journal American for March 15, 1953, 40 years ago. I almost passed by another unique shell, this time a Conus gubernator, 2 3/4", with the outline of a shoe on it, first noticed by shoemaker Nick Katsaras, and pictured in the Journal American for June 20, 1954.

Veronica Parker Johns - who purchased McArthur's shop from him, a "first cousin once removed", to quote Veronica from her autobiographical book "She Sells Seashells", back in 1964. Veronica, a New York native who was a well known author of several mystery novels, lived in an apartment around the corner from her Third Avenue shop, and operated the shop for some 25 years until her recent death. She was a faithful member of the New York Shell Club, serving as President in 1976-77, one of four women who have done so. Many rare and spectacular shells passed through Veronica's hands, but I want to especially mention a specimen of Conus gloriamaris, collected in the Solomon Islands in 1965 by K. Orepala, and donated by Veronica in 1966 to the American Museum of Natural History, where it is now, AMNH no. 126226.

Walter Freeman Webb - great collector and dealer, who moved from cold, up-state New York to sunny Florida, settling in St. Petersburg. He was one of the oldest dealers in the United States, exhibiting coins and shells at the Chicago World's Fair back in 1893. When I was visiting Florida regularly, from about 1948 to 1982, I always stopped to see my many dealer friends all over Florida, from Jacksonville to Key West, and Webb was always on my list. He never failed to invite me in for lunch, and I bought many fine shells from him on each visit.

F. G. Lowerre - another fine old shell dealer, had moved from a very small town in New Jersey to St. Petersburg, where he lived just a few blocks from Webb. Lowerre specialized in volutes, and was always interested in what shells I had obtained on the current trip. Once, while looking at a shell I had obtained, a fly came and "sat" on the tip of the spire of a rare Pleurotomaria. Lowerre grabbed up a fly swatter and slammed it down on the shell, missing the fly and luckily not harming the shell - he could have killed an elephant with the force of that blow!

Simon DeMarco - well known as a dealer and for his fine shell museum located on the north side of Ft. Myers, Florida, not far from the famous Shell Factory. I never failed to visit DeMarco, and he never failed to brag about himself, his museum, his volute collection, his Cypraea aurantium, and how he supplied other dealers with all kinds of shells. I bought my last shells from him in 1971, just before his death. He never would say what town he was born in, only that he came from Logan County, West Virginia. I suspect he was from Italy, perhaps Naples.

Jim Moore - shell dealer from Bradenton, Florida, across the Sunshine Skyway from St. Petersburg. He had a boat, and dealt mainly in shells he found himself. He was the first to offer bushels of dredged material, but I never bought any. I do have a very fine pair of the tiny red Marginella haematita, purchased in 1963.

Selma Lawson (Sammy) - another very fine, long time Florida dealer, one of the very best! Sammy is retired now, living further north in Florida, and will be 94 years old later this year. I've just received a picture of Sammy, taken this March with New York Shell Club member Dorothy Germer during a visit with Dot and John in their home in Beverly Hills, Florida. I never failed to visit Sammy on my yearly Florida trips, getting to her home in Pass-a-Grille, near St. Petersburg Beach, in company with a great Florida collector, Roger Dunn. I believe I bought more gem quality shells from Sammy than from anyone else. She was born in Doe Run, Missouri, live in New York state, then moved to Florida. He collection was sold to Sarasota Jungle Gardens when she retired from actively dealing in shells.

Archie L. Jones - Florida native, he has lived in Miami for many years and is one of the foremost collectors of Liguus tree snails and at almost 83 years old still buys and sells Liguus. [Archie regularly donates gem specimens to NYSC auctions and many other organizations. He advertises in many shell club publications - WS.]

Bob and Dottie Janowsky - Mal de Mer Enterprises - where did they get that name? Starting out as collectors in Brooklyn, New York, they now run their extensive specimen shell and shell book business from West Hempstead, Long Island. They have been members of the New York Shell Club for many years and were very active in the club for many years, serving as officers, writing articles for the NOTES, and giving many excellent shell talks. I especially remember their fabulous New Year's Eve parties, where most of the area's collectors were invited for food, drink and shell talk. One day Bob came to a club meeting and pulled a tiny box from his pocket, saying "Nick, I have something for you." Inside was a beautiful Marginella musica, a shell I had been wanting for a long time!

Masao Motoi - from Kyoto, Japan, the old capital city. I heard of this dealer when I got a postcard from Dr. Meyer Naide, well-known Philadelphia collector. I bought many rare and wonderful shells from this Japanese dealer - year after year, all through the 1950s, 1960s and 1970s, all gem. Among the shells purchased from Motoi are Guildfordia yoka, Bullina nobilis, Latiaxis deburghiae, Conus profundorum, Conus ione (a dozen at 25¢ each!), Conus zonatus, a 4 1/4" Conus stupa, Cypraea venusta, Cypraea marginata, a Conus hirasei for $10 in 1968 (this shell was $300 in 1977; now maybe $700), Cypraea teramachii, Pleurotomaria teramachii, Pleurotomaria hirasei. I have known two "super-dealers" - Masao Motoi and Selma Lawson - never did I get a shells from them that was less than a gem.

Carlos Leobrera - Mabini Street, Manila, Philippines - proprietor of Carfel Shell Export and operator of Carfel Seashell Museum. From Carlos I received a shell price list from which I sent a small order. I also subscribed to his new shell magazine which he was about to start. On October 27, 1980 I received a telegram "Congratulations! for winning First Prize, ticket no. 934, letter follows, Carfel." I received the following letter dated October 30, 1980 "Dear Nick, Congratulations for winning 1st prize for our 1979-80 promotions. I was particularly excited for you because out of hundreds and hundreds of tickets earned by people who bought a lot of shells and things from us during the whole year your one and only ticket bagged the lion's share of the awards, plus a year's subscription to CPSN magazine, Carfel Philippine Shell News. So from CPSN and my colleague Fely, happy sailing, or shelling, if you cannot come."

What I did win was this: I was to have a shelling trip on Carlos's boat for two weeks of shelling with all expenses paid, and that was valued at $1,500. If I could not go to the Philippines I was to receive $1,500 worth of shells. And so it was - I could not travel that far at that time; I had a shore to run. I sent them a list of desired shells, which were mailed to me February 3, 1981. These are some of those shells: Conus gloriamaris, C. dusaveli, C. kinoshitai, Cypraea guttata, C. aurantium, C. martini, Conus circumcisus, C. pertusus, C. cylinraceus, C. ammiralis, Voluta aulica, Murex elongatus, and a lot more, a lot more! They asked me if I could send them some kind of shell article for their new magazine, and so I did. It was about the American shell, Conus villepinii - a fine writeup and fine photo. I no longer have these materials and a number of other photos and memorabilia - these and many other items were stolen from my room!

Fernando Dayrit - Quezon City, Philippines, was one more of the many foreign shell dealers I corresponded with from the 1950s to 1980s - almost a lifetime! There is probably no other country that send out more shells than the Philippines, and the man who sent me many gems year after year is Fernando Dayrit. Like President Reagan, I cannot recall the year, perhaps in the mid-70s, that I sent him an extra large order for all kinds of rare shells, much more than usual, Conus bullatus, Voluta aulica, Latiaxis, rare murex, many others. I could not wait for the box to arrive, and when it did, I opened it and unpacked one BIVALVE after another! I hate bivalves, did not order even one, in my collection I have none! Dayrit's daughter Cristina put my mailing label on a Frenchman's box of bivalves, and his label on my shells. I wrote to this man in Lyons, France, and he wrote back, but it was a waste of time - I never got the shells I'd ordered!!

Elsie Malone, Sr. & Elsie Malone, Jr. - mother and daughter, longtime dealers on Periwinkle Way, Sanibel Island, Florida. For years they ran one of the finest shell shops in the great shelling state of Florida. A few years ago they closed their shop and now live in retirement in Ft. Myers. During all the years that I traveled to Florida for vacation and seashells, I looked forward to my visits to the Malones and was always able to "catch" some very fine and rare shells in their shop. Once I bought three very fine and rare shells, promising myself never to them. I just cannot believe that a very good friend of mine up here in the north was able to talk me out of all three of them!

Sozon Vatikiotis - Tarpon Springs, Florida. Vatikiotis was a sponge diver during the years that "bath sponges" were commercially fished off the west coast of Florida. He was a wholesaler of seashells, selling them by the bag. I once got from him six very large, gem Thatcheria mirabilis at the whopping price of $1.00 each.

Al and Bev Deynzer - Sanibel, Florida. I have known the Deynzers for many years, dating back to when they lived on Long Island, and bought shells from him there. Al was in the military, went to the Philippines, back to the USA, then to Guam. He retired and they moved to southwest Florida, opening a shop, Showcase Shells, on Periwinkle Way, Sanibel Island. I have never seen a finer shell shop - if there is one, it must be in Manila! Al was always generous, often giving me some wonderful shells. I still see them at shell shows on the east coast of the USA.

Dr. Luigi Raybaudi Massilia - Rome, Italy. I have never met him, nor have I bought shells from him - I probably can't afford to do so! He has named many varieties of Cypraea and published many publications, most of which are price lists with some articles included. His catalogs are the most lavishly illustrated booklets I've ever seen, and he has the highest prices of any dealer I've ever heard of. You have to see his price lists and the high prices he asks, just to believe them!

Philip Hano - Third Avenue at 90th Street. Hano's was established in 1980 as a general store. It has to be said that Hano started very late getting into the shell game, but he was a very smart business man, and before you could say "Crepidula" he became a leading shell dealer. It also has to be said that in addition to his many shell auctions, it was Hano who sent a great number of rare shells to Sotheby & Company of London, England to be sold at auction. Included were such shells as Conus adamsonii, Cypraea aurantium (4), Cypraea marginata, Cypraea martini, Cypraea teulerei, Harpa costata, and many more. The auction took place in March, 1970 and Hano received $5,729.00 for his shells.

The hole in the wall store - I just must say a few words about this tiny "Dealer." I cannot remember what gifts this man sold in his gift shop, but I can remember a few seashells in his showcase. There was one shell in particular that was sticking out like a sore thumb - it was large, spectacular, orange-like in color and shape and had a large price on it, all of TEN DOLLARS. I asked the man what was that orangey thing in the show case? He said it was some kind of a seashell he had just received from one of the islands far away. "Philippines?" I asked. No, it was not from there. "Fiji," I said. Yes, that was the island. "How did you get it?" I then asked. I sent some clothes to some missionaries and they sent me this seashell. "Can I see it?" I asked. I took a good look at it - it was gem, perfect, except for a small dark spot that just wouldn't come off. This bothered me a lot, so I went away and came back a few days later.

"Can I see that shell again?" "Sure," he said. "Can I go in the back?" Back I go, got my knife out and scratched that spot off - off it went! Was I glad! How much did he want for the shell - $10! That was a lot, as I didn't know a shell, then, from a hole in the ground. Neither did this "dealer." "O.K.," I said. "I will give you $10 if you throw in that shell over there, the one next to the orange shell." It was a very large land shell that looked like a man's shoe. "It's a deal," he said. Later on I sold the big land shell for $2.00 - that brought the price of my orange shell to $8.00. [Can we believe that this was the first Cypraea aurantium Nick ever saw? - WS] I've been checking over the labels for the shells in my collection, and the number on that orange shell was 22! I did something on that label that I never did again - I put the date on the label - March 29, 1950. I refused many offers for that shell, but finally a collector came along and made me an offer I couldn't refuse - the shell could not have gone to a better person.

This little store was or is on 23rd Street near Seventh Avenue. I went there on March 28, 1993 and it is still there! It's a bit different - no longer a gift shop, but a dry cleaning shop, owned by (whom else) a Greek!!

There are a few other dealers I would like to mention: Bob & Betty Lipe, at St. Petersburg Beach, Florida, specializing in Marginella - I have bought real gems from them for many years; Phillip W. Clover, Glen Ellen, California, have bought shells from him for many years and he visited me once in Bergenfield, new Jersey; Donald Dan, West Friendship, Maryland, he exhibits and sells shells in almost all the shell shows in the USA and overseas - have bought some fantastic shells from him; The Abbey Specimen Shells, Santa Barbara, California - did buy a few shells from them, of very fine quality; Richard M. Kurz, Wauwatosa, Wisconsin, I have bought from him for many years - I once had a 120 mm Volutoconus grossi and he wrote and offered me $300, I declined, then he wrote and offered $400, no sale!!

John Q. Burch, Los Angeles, California wasa fine dealer and for years I bought quite a few fine shells from him. I cannot get very enthusiastic about him, as he wrote me one of the only two nasty letters from a dealer that I ever got. The other such letter was from DeMarco - The Burch letter was the nastier of the two.

George Jacobs - New York City collector-dealer. He was a very good collector and later a dealer; he bought the remaining shells of the famous Weeks collection and was selling it through the mail. He was President of the New York Shell Club in 1959 and 1960. I once had a shell he wanted very much and he came to Bergenfield, New Jersey. He brought me in trade a Voluta ponsonbyi - we had a deal! My shell cost me all of $1.00!! and is now offered for sale for several hundred dollars.

Hollingsworth - way out near Tampa, Florida, difficult to get to, though I did get there a couple of times. He dealt in common shells only, but had good material.

Jim Donovan, West Palm Beach, Florida, one of the oldest and best dealers. I met him way back, he once came to Bergenfield, almost in front of the store, but did not manage to find it! I still have a super red base Cypraea mappa bought from him. The thing about him I remember most is that he wanted to see a persimmon tree - later I saw one in his back yard, so he did manage to find the tree.

Saxton, V. M. (?), Sarasota, Florida, a long ago dealer from the Sunshine State. I remember one thing about visiting him - someone stole my return bus ticket to Ft. Myers out of my front shirt pocket - yes, we had thieves in those days also!

Mrs. F. K. Hadley, Newton, Massachusetts, near Boston. She was another very fine dealer, always had very fine shells. Once I went all that way to visit her.

Frank (?) Myer, St. Petersburg, Florida. He and I go way, way back. Perhaps he was the first Florida dealer I bought shells from. He had many shells in his gift shop, and I still have a splendid Conus cylindraceus I bought from him - three specimens for $3.00 - those were the days!!

Snyder - a dealer from way back who lived in the heart of Miami. He sold electrical equipment but also dealt in seashells and was quite good at it. He never spent a dime, but always exchanged. I still have a super Conus bullatus from him.

[I hope all our readers enjoy Nick's reminiscences as much as I enjoyed typing them. We greatly appreciate Nick sharing his "shelling past" with us and invite others of you to share similar memories of dealers, and also of noted collectors. I can personally think of a number of people, so watch for accounts in future - WS]

MAY 1993 NYSC Auction/Social Meeting - ACKNOWLEDGEMENTS

We thank the following for their varied contributions to the success of this important club event. In addition to the alphabetical list below, we wish to specially single out Dorothy Jensen for her always gracious hospitality and Sol Weiss for all the work he does in assembling the shells for the auction.

Allen Aigen
John Cole
Edward Cowles
Romuald Czepulkowski
Dr. & Mrs. Leonard De Duke
Dr. Edward A. Dunlap
Harvey Frajlich
Henry Gordon
Dr. Hans & Arline Reimann
Walter E. Sage
Al Scarpetti
Rae Varga
Milton Werner
Mathilde Duffy
Marty Gill (Shamaron Shells)
Richard Goldberg (Worldwide)
Sue Hobbs
Dottie & Bob Janowsky
Archie L. Jones
Mique & Pinky Pinkerton
Dan Spelling
Victor Wee
David Epstein
Leon Juster
Nick Katsaras
Theta Lourbacos

Of course, we also thank all who came and participated in the festivities. Without all of you, this annual function could not take place. Milton Werner will have the details ready for the September NYSC Notes - for now, thanks to all!

Collecting "Off Limits" in Mexico and Tonga; Florida Law

You may have seen the advertisement for a shelling trip to Tonga that was to have been conducted by Charles Cardin and Tom Rice. This has been changed to a tour of the Philippines since the Kingdom of Tonga has outlawed the taking of any living mollusk. Similarly, we have seen mention that no collecting is allowed in Mexico. In addition, snorkeling in Florida without using a dive flag carries a $115 fine!!

A Holiday Observation Trip to the Keys

by Marlo F. Krisberg (The Capsule, ATSC newsletter)

This past Christmas break my daughter Sabrina (14) and I made a three-day snorkling trip to the Lower Keys. It was a spur-of-the-moment thing - something not recommended during this time period unless you are willing to sleep in your vehicle and search mightily for a camp ground with some "overflow" space available for which you will be placed on a waiting list and "call back around dinner time." It was mobbed! "As usual," according to our friends in the area who promised to find us a place to park the van, even if it had to be their front yard. The weather was sunny, the water cool (wet-suit needed), and the wind was up, which although not excessive, was enough to restrict good visibility to about five feet. This was my first winter trip to the Keys. Conditions were "better than usual" for this time of year according to the "regulars" we talked with that visit every Christmas.

Sabrina is rabidly opposed to taking live shells for any reason. Since I have not been very active in trading in recent years and am concerned with the depletion of many species in Florida waters, our dives were restricted to observations and the taking of only dead shells. All our forays were off beaches, parks, roadsides, etc. where conditions looked inviting. We snorkled off the Keys from the Seven Mile Bridge to Ramrod on both the ocean and gulf sides. we made about ten dives of up to 90 minutes duration.

For those of you that may be planning similar trips a word of caution: The State patrol inspected us twice (along with everyone else in the area) to determine if we were taking any sealife illegally or without licenses (a fishing license is required to take live seashells). They looked in coolers and asked to look in the van. We were pleased that such tight control is being exercised. On one occasion an officer cautioned us not to dive without a flag. Sabrina had gone ashore with our flag and left me out on some flats on my knees hand dredging. I had my snorkling gear on even though I wasn't swimming. The officer let us know that the fine for snorkling without a dive flag is $115!

Sabrina and I had a delightful time, and much to my happy surprise, came upon much sealife that was becoming very scarce several years ago.

We observed the following mollusks (numbers refer to Abbott's American Seashells)

Astraea phoebia	479	Fasciolaria tulipa	2500
Astraea americana	481	Fasciolaria hunteria	2502
Batillaria minima	990	Jaspidella jaspidea	2549
Cerithium litteratum	994	Vasum muricatum	2646
Cerithium eburneum	995	Prunum apicinum	2730
Xenophora conchyliophora	1572	Conus regius	2788
Strombus gigas	1583	Conus mus	2790
Strombus raninus	1585	Conus jaspideus	2792
Trivia pediculus	1623	Terebra dislocata	2836
Erato maugeriae	1618	Chlamys sentis	5138
Cyphoma gibbosum	1664	Lima lima	5240
Cypraea cervus	1639	Papyridea soleniformis	5555
Cypraea cinerea	1641	Chione cancellata	5865
Natica pusilla	1719	Tellina radiata	5636
Tonna maculosa	1784	Tellina lineata	5660
Murex pomum	1828	Tellina listeri	5640
Morula nodulosa	1872	Tellina fausta	5643
Columbella mercatoria	2044	Tagelus divisus	5816
Pleuroploca gigantea	2506	Octopus vulgaris	6352

Be sure to get your Florida fishing license if you plan a Summer collecting trip.

THE SPECIES CONTROVERSY

by Allen Aigen

Anyone who gets beyond casual shell collecting will start to question why a particular level of variation in one group is considered adequate to define separate species, but in another group similar distinctions merely denote local "races" or ecological variations. Although there are good theoretical reasons for this, in practice we rely on the experts (who often do not agree among themselves).

Species do exist, and are not simply a matter of arbitrarily pigeonholing members of a continuum. In a local fauna, a good collection is generally sufficient to distinguish one species from another. requirements are an educated observer, a good sample (the more variability, the larger the sample required), and excellent data. Live specimens may be necessary where the variability within a group is not well reflected in the shell alone.

The process of distinguishing and naming species is as old as Adam, and has been practiced in all cultures where a need has developed to distinguish local species for food or other utility. Carl Linnaeus simply codified this process on a worldwide basis, but without a good theoretical definition of species.

Once you get beyond a local fauna, the number of specimens that need to be critically compared may increase tremendously, and the more areas sampled the better. Even fossil species can be described as to their area of occurrence and limits of variation (invertebrate species live an average of about 5 million years in their geographical area, with little variation over time).

Where does the problem come from? Start with the first lists of Linnaeus. His species concept acknowledged neither evolution nor the breadth of variability in many species. Each name was attached to a single specimen (which we now call a type, or the holotype) which represented the entire species. This is still the accepted practice, except that we now expect better, more detailed descriptions, better illustrations and more collection data, preferably based on a large suite of specimens, representing as well as possible the range of variation within the species. But sadly, we are still plagued with poor work and cannot simply ignore properly published names, no matter how poor the work. New names which do not reflect adequate knowledge of all related species previously described will often end on a synonym list. Poor work is not necessarily synonymous with amateur work. Some of our most competent malacologists are "amateurs" (the word is derived from the Latin word for love, i. e., they love their work), while some professionals turn out poor work. Lumpers and splitters both are poor systematists. They just do not have an adequate basis for their conclusions, and allow their prejudices full rein. True science requires impartiality and objectivity.

Though collectors often feel there is fame in describing a new species, systematic biologists see this process as laborious, underpaid labor with no end in sight. Naming a species is the first step toward future work on the named taxon. Good workers will refrain from naming a species from inadequate material, but will often cite such material (for example, "species A") for future studies,

Modern systematic biology is based on a concept of species as non-interbreeding populations (not individuals!). Although conchologists most often deal with empty shells in a cabinet, this concept must still be reflected in accurate species definitions. When a species has a wide range of variation, we look for intergrading between races and varities (populations), to show that they do interbreed. For example, many muricids vary widely in the size of their spines or frills, depending on wave action. Here a wide range of samples with very good collecting data will be adequate to link the variations and explain the ecological reason for the variation. The importance of understanding variation cannot be overempasized.

Some workers think that DNA or other biochemical studies will solve all problems in systematics. However, we do not know which bits of genetic data sampled are critical for successful breeding. Biochemical studies can amass large amounts of data suitable for statistical analysis, which can be used to segregate populations as genetically distinct. Whether this data is sufficient to enable us to distinguish between species is problematical at best. We know that genetic data for humans and chimpanzees is very close, but we still call these distinct species. Empty shells are worthless for genetic analysis, and much more supplemental data is required before genetic studies produce qualitative results. With the time and expense involved in biochemical studies, don't expect many results soon!

Breeding live specimens is often impossible, but sometimes simple examination of live specimens is adequate for determining species. Hydrobiid snails in rivers and streams in Florida have simple shells, varying only slightly from place to place. For these snails, studies of male reproductive structures have shown that each species has a destinct penis shape. Since you cannot interbreed with incorrect equipment, these populations have been named as distinct sibling species.

In other instances other evidence can demonstrate that interbreeding does not occur. Limpets on the northeast coast (Notoacmea alveus (Conrad)) which lived on sea grass were long assumed to be simple ecological variants of the rock dwelling form (N. testudinalis (Muller)). Recent studies as reported in a recent issue of Natural History showed that these grass dwellers became extinct when the sea grass died off in the northeast. If the species were the same, spawn from the rock dwelling form would have recolonized the sea grasses when these began to return. It took the extinction of the species before it was recognized as distinct!

Both the limptes and hydrobiids represent examples of speciation, probably in a relatively short period of time, connected to radical environmental changes during or soon after the Ice Age. One case represents a physical separation of populations leading to a genetic separation. The other represents an ecological separation probably due to a favorable genetic predisposition (specimens which could live on sea grass) which quickly led to enough changes to prevent interbreeding with those adapted to living on rocks.

Other limpet species are known to have a narrow, fragile form which live on sea grasses, for example, Patelloida pustulata (Helbling) in Florida. Are these thus separate species? A relatively simple experiment would be to transplant immature specimens of the rock-dwelling form to sea grasses and vice-versa. Would these juveniles survive? Would their shapes change to conform to their respective environments? Breeding experiments might provide supplemental data.

Can we actually see the speciation process? Since it may take thousands of generations to effectively separate the daughter species, can we see any "caught in the act?" Yes! It is easiest to see examples in geographically separated populations. Although most species are very stable over time over most of their range, there may be changes at the extremes of these ranges. Liguus tree snails in southern Florida have "races" with distinct markings in different areas (hammocks in the Everglades and islands in the Keys) which breed true. Interestingly, these "races" readily interbreed. Recent studies have shown that genetically all named forms of Liguus belong to a single species, Liguus fasciatus (Muller). The color patterns are superficial and make no difference in their ability to recognize each other as the same species for breeding purposes.

The next step in separation is subspecies. Species like Mercenaria mercenaria (Linne) and Argopecten irradians (Lamarck)have distinct subspecies along the Atlantic and Gulf coasts. There was apparently a progressive change in shape along the coast which had been separated into distinct populations by Ice Age changes in sea level. The differences are minor and individuals may be hard to place in the proper subspecies, therefore they are considered to be less than full species. If someone published the names as full species, would it be correct? Pick an expert and see if his logic makes sense. Were breeding experiments conducted? Were any biochemical data used, were paleogeographic or statistical studies done? Remember that data can be interpreted in a variety of ways - no two experts will agree!!

Although there may seem to be no geographic separation across an ocean, for example, the Caribbean, there are many mollusks that are endemic (restricted to a small area) or have relict populations in only small parts of the former range. Volutes often have restricted ranges as they emerge from the egg capsule as miniature crawling young and do not migrate far to breed. Some snails with long-lived planktonic larvae (as in some Cymatium species) spread across the entire world. There are many variations on these themes. Understanding the limits of variation in a species should include an understanding of how the species is dispersed (or how it is not!). This study is called biogeography.

There is increasing evidence for rapid, local bursts of speciation that may stay very local in area and time. These new species are accompanied by a rapid increase in the range of variation in the parent species, so that a very conservative (lumper's) view may be that the extreme form is best treated as a variant rather than as a new species, until or unless it becomes clearly distinct and without intermediates. I have many similar problems with Ice Age snails in Florida, but the collection methods prevent adequate documentation of changes through time and space.

So how can the poor collector, facing a new species name on a dealer's list, tell if he has the opportunity to add a new species to his collection, or simply be ripped off by what he already has under a different name? If you have more time than money, read the original reference and and any subsequent studies.

The most important thing to remember is, of course, to always have accurate locality data with your specimens. Species names may and actually are changing all the time, but the locality will always be constant. Your specimens with detailed locality information may one day help resolve the species controversy.

Progress at the Bailey-Matthews Shell Museum, Sanibel Island, Florida

by Rene Affourtit, President, Board of Trustees

Thanks to the help of many who have contributed to the capital campaign, much has been accomplished over the past few months.

The site for the museum building has been cleared and prepared for construction of the building, with several hundred native trees relocated on the premises.

The structural components of the entrance bridge were delivered on March 4.

The contract for installation of the bridge hasbeen awarded to George Parker, Inc. and work is currently underway.

The total of the capital campaign cash, pledges and in-kind gifts passed the $1 million mark with the pledge underwriting of the bridge by a generous supporter.

Of the $1,022,000 campaign total (as of March 15), $265,000 has already been committed to the clearing costs, the bridge and its installation.

With construction of the building scheduled to begin within 60 days, we are now in the wrap-up stage of the capital campaign. Additional contributions will help see the museum through to completion and your assistance will be appreciated.

[Tucker Abbott tells me that they are actively building exhibits and curating the collections that have been donated. There is a Welcome Center set up at Edie Mugridge's former shell shop on Periwinkle Way on Sanibel. I hope to have more information by the time we meet again in September - WS]

TABLE 1.

continued

Species	**NATIVE TO/Introduced To (date of collection)/MECHANISM (M) (see keys, below)**	**References and Remarks**
Ostrea edulis Linnaeus, 1758 (edible oyster)	NE ATLANTIC/NW Atlantic: ME (1949) and RI (1991). NE Pacific: See remarks. M: Maine: IR; Rhode Island: ?	Loosanoff, 1962, Welch, 1966, Hidu and Lavoie, 1991. May be established in bays and harbors of Rhode Island (J. D. Karlsson, collector, 1991). Raised in aquaculture facilities on the Pacific coast, but not known to be naturally established (rare natural settlement has occurred in Tomales Bay CA (Davis and Calabrese, 1969)). Raised along NW Atlantic coast with small natural sets north to Halifax County, Nova Scotia (M. Helm, personal communication, 1990).
Mactriade		
Rangia cuneata (Sowerby, 1831) (Atlantic rangia)	GULF OF MEXICO/NW Atlantic: FL east coast to Chesapeake Bay (1955); NY: Hudson River (1988, C. Letts, collector). M: to Chesapeake Bay: COI?/BW?, to Hudson River: BW	Hopkins and Andrews, 1970. Newly established in lower Hudson River perhaps due to release as larvae in ballast water from Atlantic or Gulf coasts
Tellinidae		
Macoma "balthica" (Linnaeus, 1758) (Baltic macoma)	NW ATLANTIC/NE Pacific: San Francisco Bay. M: COI	Meehan et al. 1989. The genetic similarity of San Francisco Bay populations to NW Atlantic populations (as opposed to specimens from Europe or further north on the Pacific coast) suggest that the San Francisco *M. "balthica"* were probably introduced in the 19th century. Very common.
Semelidae		
Theora lubrica Gould, 1861 (Asian semele)	NW PACIFIC/NE Pacific: CA: Los Angeles Harbor, Anaheim Bay, Newport Bay (earliest southern CA record, 1968); San Francisco Bay (1982). M: BW	Seapy, 1974, Carlton et al. 1990. It is of interest to note the increase of this species in 1978–79 in polluted environments in the Inland Sea of Japan (Sanukida et al. 1981), the source of much ballast water carried to the NW Pacific, and its appearance in the early 1980s in San Francisco Bay. Intracoastal movement to San Francisco Bay from southern CA is also possible.
Dreissenidae		
Dreissena polymorpha (Pallas, 1771) (+zebra mussel)	NE ATLANTIC/NW Atlantic: estuarine populations in NY: Hudson River (summer 1992, up to 5/oo, W. Walton, personal communication, 1992). M: from Europe to the Great Lakes (1988), BW; within North America: see Carlton, 1992b	Griffiths et al. 1991, Strayer, 1991, Hebert et al. 1991, Carlton, 1992b, Nalepa and Schloesser, 1992. Ballast water in coastal vessels and ballast, bilge, or incidental water in small sailing vessels could transport zebra mussels between estuaries along the Atlantic coast. Usually in low densities in brackish water (W. Walton, personal communication, 1992).
Mytilopsis leucophaeata (Conrad, 1831) (dark falsemussel)	NW ATLANTIC-GULF OF MEXICO/NW Atlantic: NY: Hudson River (1937); MA: no locality (Marelli and Gray, 1985:118), perhaps Boston: Charles River? M: S/BW	Rehder, 1937, Jacobson, 1953. Specimens are believed to have been collected from the lower Charles River, near Boston (R. T. Abbott, personal communication, 1990; R. Turner, personal communication, 1992). Native (?) from Chesapeake Bay south.

continued on next page

TABLE 1.

continued

Species	**NATIVE TO/Introduced To (date of collection)/MECHANISM (M) (see keys, below)**	**References and Remarks**
Trapeziidae		
Trapezium liratum (Reeve, 1843) (+Japanese trapezium)	NW PACIFIC/NE Pacific: BC: Ladysmith Harbor (1949?); WA: Willapa Bay? (1947?). M: COI	Carlton, 1979a. Populations are present in BC (R. Forsyth, personal communication, 1991). Status in WA not known. Never established in CA; report in Abbott (1974) of appearance "prior to 1935" based upon interceptions in Pacific oyster shipments. Nestling in fouling communities.
Corbiculidae		
Corbicula fluminea (Muller, 1774) (=*C. manilensis* auctt.) (Asian clam)	NW PACIFIC/NE Pacific: estuarine populations in OR: Siuslaw River; CA: Smith River, San Francisco Bay; NORTH AMERICA/NW Atlantic: estuarine populations in Chesapeake Bay: James River. Freshwater populations throughout the United States, northern Mexico. M: from Asia to N. America (1920s–1930s), IR; within North America: see Counts, 1986	Counts, 1986, 1991; estuarine populations: Diaz, 1974, Carlton, 1979a, Nichols et al. 1990, Counts, 1991:105. Abundant locally, but in lower densities in brackish water.
Veneridae		
Venerupis philippinarum (A. Adams and Reeve, 1850) (=*Tapes semidecussata* Reeve, 1864; = *T. japonica* Deshayes, 1853; also placed in subgenus *Ruditapes*). (Japanese littleneck)	NW PACIFIC/NE Pacific: BC (1936) to CA: Monterey Bay: Elkhorn Slough (1949). OR: Netarts Bay (see remarks). M: COI except for OR: IR	Fisher-Piette and Metivier, 1971 (specific taxonomy and synonymy), Bourne, 1982, Anderson et al. 1982, Bernard, 1983, Ketchen et al. 1983. Generic placement follows E. Coan and P. Scott (personal communication, 1992). Intentional plantings in OR: Netarts Bay sporadically from 1960s–1980s resulted in a naturally reproducing population (Gaumer and Farthing, 1990); also planted in other OR bays, where specimens should be expected. Common to abundant in coarser sediments.
Gemma gemma (Totten, 1834) (amethyst gemclam)	NW ATLANTIC/NE Pacific: CA: Bodega Harbor (1974) to Elkhorn Slough (1965); earliest record 1893, San Francisco Bay. M: COI	Carlton, 1979a. Records from north of Bodega or south of Monterey Bay are based upon misidentifications. Abundant in soft sediments.
Mercenaria mercenaria (Linnaeus, 1758) (northern quahog)	NW ATLANTIC/NE Pacific: CA: Alamitos Bay (1967). M: IR	Crane et al. 1975, Murphy, 1985a, 1985b. The only established population on the Pacific coast of this common Atlantic species is in this small CA bay. Hertz and Hertz (1992) report a single live specimen from Mission Bay, San Diego, probably from discarded bait or food.
Petricolidae		
Petricola pholadiformis (Lamarck, 1818 (false angelwing)	NW ATLANTIC/NE Pacific: WA: Willapa Bay (1943); CA: San Francisco Bay (1927), Newport Bay (1972). M: COI	Hanna, 1966, Carlton, 1979a. In higher shore hard shale, clay, mud substrates.
Myidae		
Mya arenaria Linnaeus, 1758 (softshell)	NW ATLANTIC/NE Pacific: AK (1946) to Monterey Bay: Elkhorn Slough (<1911). M: COI	Carlton, 1979a, Bernard, 1979. Became extinct on Pacific coast from southern AK south in late Tertiary; reestablished (earliest record 1874, San Francisco Bay) through accidental introduction with Atlantic oysters. Now one of the most common upper bay clams from WA to San Francisco Bay.

continued on next page

TABLE 1.

continued

Species	**NATIVE TO/Introduced To (date of collection)/MECHANISM (M) (see keys, below)**	**References and Remarks**
Corbulidae		
Potamocorbula amurensis (Schrenck, 1861) (+Amur river corbula)	NW PACIFIC/NE Pacific: CA: San Francisco Bay (1986). M: BW	Carlton et al. 1990, Nichols et al. 1990. In densities of tens of thousands per square meter in estuarine reaches of San Francisco; to be expected in other CA bays through intracoastal transport of larvae in ballast water.
Teredinidae		
Lyrodus pedicellatus (de Quatrefages, 1849) (=*Teredo diegensis* Bartsch, 1927) (blacktip shipworm)	INDO-PACIFIC?/NE Pacific: CA: San Francisco Bay (1920); Monterey Bay (1935); Santa Barbara to San Diego Bay (earliest southern CA record 1871). M: S	Kofoid and Miller, 1927, Turner, 1966, Ecklebarger and Reish, 1972, Carlton, 1979a
Lyrodus takanoshimensis Roch, 1929 (+)	NW PACIFIC/NE Pacific: BC: Ladysmith Harbor (1981). M: COI (in wooden oyster boxes)	Popham 1983.
Teredo bartschi W. Clapp, 1923 (Bartsch shipworm)	NW ATLANTIC/NW Atlantic: NJ: Barnegat Bay (1974), CT: Long Island Sound: Waterford (1975); NE Pacific: Gulf of California: La Paz (<1971); Mexico: Sinalao (1978–79). M: S	NW Atlantic: Hoagland and Turner, 1980, Hoagland, 1981, 1986, Richards et al. 1984. Gulf of California: R. Turner in Keen, 1971:282, Hendrickx, 1980. Reported by Abbott (1974) as introduced to CA, a record based upon specimens from San Diego Bay in the 1920s (Kofoid and Miller, 1927). May no longer be present in Barnegat Bay in thermal effluents, but still established in Long Island Sound heated power plant effluents at Millstone.
Teredo navalis Linnaeus, 1758 (naval shipworm)	NE ATLANTIC?/NE Pacific: BC: Pendrell Sound (1963); WA: Willapa Bay (1957); OR: Coos Bay (1988); CA: San Francisco Bay (1913); southern CA? NW ATLANTIC: see remarks. M: S	Turner, 1966, Carlton, 1979a. Coos Bay record: JTC, field records. Cryptogenic in NW Atlantic: early American records include reports both from visting vessels (Russell, 1839, MA) and from established populations (DeKay, 1843, NY). Grave (1928) enigmatically noted, "The date of its first appearance in [Woods Hole] is not known," noting records as early as 1871. If introduced, it may have arrived centuries ago with visits of earliest European vessels.
Teredo furcifera von Martens in Semon, 1894 (+)	NW ATLANTIC (Caribbean north to FL)/NW Atlantic: NJ Barnegat Bay (1974). M: S	Hoagland and Turner, 1980, Richards et al., 1984. Probably only temporarily established in Barnegat Bay in thermal effluents of power plant (K. E. Hoagland, personal communication, 1992) and may no longer be present there. Turner (1966) records an earlier nonestablished population in NC.
Laternulidae		
Laternula limicola (Reeve, 1863) (=*L. japonica* auctt.) (+)	NW PACIFIC/NE Pacific: OR: Coos Bay (1963). M: BW	Keen, 1969. Not recorded in Coos Bay since 1965, and not re-discovered there despite intensive searching from 1986–1989 (JTC and students, field records).

Mechanisms of introduction

S = Ships (fouling and boring)
SB = Ships (solid ballast: rocks, sand)
BW = Ships (ballast water)
COI = Fisheries: Accidental release with commercial oyster industry
IR = Fisheries: Intentional release
DA = Fisheries: Accidental release with discarded algae (seaweed) in shellfish packing

continued on next page

TABLE 1.

continued

Species	**NATIVE TO/Introduced To (date of collection)/MECHANISM (M) (see keys, below)**	**References and Remarks**

Regions (as used here:)
Northwest (NW) Pacific = Asia: China, Japan, Korea
Northeast (NE) Pacific = Pacific coast of North America: Alaska to Mexico
Northwest (NW) Atlantic = Atlantic coast of North America: Canada to Florida
Northeast (NE) Atlantic = Europe: northern and western

AK	Alaska	NJ	New Jersey
BC	British Columbia	NW	Northwest
CA	California	NY	New York
CT	Connecticut	OR	Oregon
FL	Florida	RI	Rhode Island
MA	Massachusetts	TX	Texas
ME	Maine	VA	Virginia
NC	North Carolina	WA	Washington
NE	Northeast		

It is of interest to note that 19 (63%) of the 30 species occur in San Francisco Bay. Only the embayments of the Pacific Northwest approach this number of established species, with Willapa Bay having 12 species, Puget Sound 11 species, and Boundary Bay 13 species. These numbers will increase with further exploration (for example, *Trapezium liratum, Crepidula convexa* and *Crepidula plana* should be expected more widely than now reported in Washington and British Columbia) and with new introductions.

Four of the introduced mollusks on the Atlantic coast are from Europe and 3 (as noted above) are southern species now established in northern localities. Only 2 species are widespread, the European periwinkle *Littorina littorea*, and the Gulf of Mexico clam *Rangia cuneata*. The European oyster *Ostrea edulis*, long restricted to Maine, now occurs in Rhode Island as well, although the means of introduction of this population (whether by transport from Maine as a ship-fouling organisms, or by intentional release, or by escape from aquaculture facilities) is not yet known. The shipworm *Teredo bartschi* occurs within the thermal plume of a nuclear power plant in Long Island Sound; the status of the population of this species, and of another southern teredinid, in New Jersey is not clear. Estuarine populations of 2 typically freshwater bivalves, the Asian clam *Corbicula fluminea* and the European zebra mussel *Dreissena polymorpha*, are known from limited locations.

The sole clearly introduced marine mollusk in the Gulf of Mexico, *Perna perna*, is from South America. Were it not for this recent report, there would be no certain records of introduced mollusks in the Gulf fauna.

Regional Patterns of Mechanisms of Introduction

The human-mediated dispersal mechanisms that have led to the introduction of non-indigenous mollusks to North American coasts have played strikingly different regional roles (Table 4). Far exceeding all other mechanisms in terms of number of species successfully transported and introduced is the now largely historical movement of the Atlantic oyster *Crassostrea virginica* and the Pacific (Japanese) oyster *Crassostrea gigas* to the bays and estuaries of the Pacific coast of North America from the 1870s to the 1930s, and from the 1900s to the 1970s, respectively (Table 1). Atlantic oyster importation ceased due to lack of breeding success and because of competition with the increasing importation and culture of the Pacific oyster. Pacific oyster importations stopped after sufficient natural sets and regional aquaculture operations were able to supply adequate amounts of seed.

These industries led to the introduction of at least 22 mollusks to the Pacific coast (Table 4: the 20 species shown for COI plus the 2 species of oysters); 9 are from Japan and 13 are from the Atlantic. Intentional fishery releases added another 2 species (the Asian clam *Corbicula fluminea* and the Atlantic quahog *Mercenaria mercenaria*, which curiously did not become established through the oyster industry) to the Pacific coast fauna.

Prior to these industries and releases, only a few species of mollusks had been transported to or within North America. The earliest introduction may have been the cryptogenic shipworm *Teredo navalis* to the New England coast. The European snail *Littorina littorea*, prehistorically present in the northwestern Atlantic, was returned to North America before 1840 either intentionally (released by European settlers in eastern Canada to establish a periwinkle fishery) or accidentally (with ballast stones). A late 18th century—early 19th century introduction to the Atlantic coast with ballast stones may have been the European marsh snail *Ovatella myosotis* (subsequently then transported with oysters to the Pacific coast). On the Pacific coast, mid-19th to early 20th century ship-mediated introductions included the shipworms *Teredo navalis* and *Lyrodus pedicellatus*, as well as the Mediterranean mussel *Mytilus galloprovincialis*, whose introduced status was long overlooked in California due to its previous identification as the "native" *Mytilus edulis*.

Ballast water has played a small role in terms of the numbers of introduced species, although at least 2 of the species introduced by this means are ecologically and/or economically significant invasions. For a number of species, the role of ballast water as a mechanism is submerged among a number of other mechanisms that are not easily distinguished from each other. Thus, ballast water or ship fouling may have led to the 20th century movement of the North American native dreissenid *Mytilopsis leucophaeata* to the Hudson River. Either mechanism may also have played a role in the appearances of the South American bivalves *Mytella*

TABLE 2.

Introduced marine and estuarine mollusks of North America: Established and other species arranged by donor region.
Regions: See Table 1, footnote.

	Donor Region	Receiver Region
ESTABLISHED		
Cecina manchurica	NW Pacific	NE Pacific
Batillaria attramentaria	NW Pacific	NE Pacific
Ceratostoma inornatum	NW Pacific	NE Pacific
Nassarius fraterculus	NW Pacific	NE Pacific
Musculista senhousia	NW Pacific	NE Pacific
Crassostrea gigas	NW Pacific	NE Pacific
Theora lubrica	NW Pacific	NE Pacific
Trapezium liratum	NW Pacific	NE Pacific
Corbicula fluminea	NW Pacific	NE Pacific
	N America	NW Atlantic
Venerupis philippinarum	NW Pacific	NE Pacific
Potamocorbula amurensis	NW Pacific	NE Pacific
Lyrodus takanoshimensis	NW Pacific	NE Pacific
Lyrodus pedicellatus	Indo-Pacific?	NE Pacific
Littorina littorea	NE Atlantic	NW Atlantic
Ovatella myosotis	NE Atlantic	NW Atlantic
Ostrea edulis	NE Atlantic	NW Atlantic
Dreissena polymorpha	NE Atlantic	NW Atlantic
Mytilus galloprovincialis	Mediterranean	NE Pacific
Teredo navalis	NE Atlantic?	NE Pacific
Crepidula convexa	NW Atlantic	NE Pacific
Crepidula fornicata	NW Atlantic	NE Pacific
Crepidula plana	NW Atlantic	NE Pacific
Urosalpinx cinerea	NW Atlantic	NE Pacific
Busycotypus canaliculatus	NW Atlantic	NE Pacific
Ilyanassa obsoleta	NW Atlantic	NE Pacific
Ovatella myosotis	NW Atlantic	NE Pacific
Geukensia demissa	NW Atlantic	NE Pacific
Crassostrea virginica	NW Atlantic	NE Pacific
Macoma "balthica"	NW Atlantic	NE Pacific
Gemma gemma	NW Atlantic	NE Pacific
Mercenaria mercenaria	NW Atlantic	NE Pacific
Petricola pholadiformis	NW Atlantic	NE Pacific
Mya arenaria	NW Atlantic	NE Pacific
Perna perna	South America	Gulf of Mexico
Rangia cuneata	Gulf of Mexico	NW Atlantic
Teredo bartschi	NW Atlantic	CT: Long Island Sound
	NW Atlantic	NE Pacific
Mytilopsis leucophaeata	NW Atlantic	NY: Hudson River
ESTABLISHMENT NOT CERTAIN		
Clanculus ater	NW Pacific	NE Pacific
Sabia conica	NW Pacific	NE Pacific
Anomia chinensis	NW Pacific	NE Pacific
Teredo furcifera	NW Atlantic	NJ: Barnegat Bay
NOT ESTABLISHED		
Littorina littorea	NW Atlantic	NE Pacific
Ostrea edulis	NE Atlantic	NE Pacific
Tectarius muricatus	NW Atlantic	NE Pacific
Truncatella subcylindrica	NE Atlantic	NW Atlantic
Mytella charruana	South America	NW Atlantic
Patinopecten yessoensis	NW Pacific	NE Pacific
Laternula limicola	NW Pacific	NE Pacific
CRYPTOGENIC		
Siphonaria pectinata	Mediterranean?	NW Atlantic?
Teredo navalis	NE Atlantic?	NW Atlantic?

charruana in Florida and *Perna perna* in Texas. Ballast water or the movement of commercial oysters may have transported the clam *Rangia cuneata* from the Gulf of Mexico to Chesapeake Bay, from where it may have spread down the coast to Florida, and from where it may have been carried in ballast water to the Hudson River.

On the California coast, a complex mixture of ballast water, ship fouling, or the movements of shellfish may have led to the

TABLE 3.

Summary of introduced marine and estuarine mollusks (excluding opisthobranchs) of North America.

	Established	Establishment Not Certain	Not Established	Cryptogenic
To Pacific coast (Northeast Pacific) from:				
Northwest Pacific	12	3	2	
Indo-Pacific?	1			
Northwest Atlantic	15		2	
Northeast Atlantic?	1			
Northeast Atlantic			1	
Mediterranean	1			
Subtotal	30	3	5	
To Atlantic coast (Northwest Atlantic) from:				
Northeast Atlantic	4		1	1?
Gulf of Mexico	1			
Northwest Atlantic	2	1		
South America			1	
North America	1			
Subtotal	8	1	2	1
To Gulf of Mexico from:				
Mediterranean				1?
South America	1			
Subtotal	1			1
Total	39(*)	4	7	2

(*) Total of 36 species; *Ovatella, Corbicula,* and *Teredo bartschi* are each scored twice (see Table 2), because they originate from different donor regions depending upon the recipient regions.

transportation of the Atlantic mussel *Geukensia demissa* from central California to southern California and of the Japanese mussel *Musculista* senhousia from the northern Pacific coast to southern California. Superimposed upon these potential intracoastal mechanisms and routes is the probability that Asian mollusks have been introduced more than once to the Pacific coast; early introductions of the mussel *Musculista* are linked to the commercial Pacific oyster industry, while its appearance in the 1970s in southern California may be due to ballast water release directly from Asian ports. Similarly, the Asian clam *Theora lubrica* may have been introduced in separate incidents from Asia to both central and southern California; nearly 15 years separate its initial discovery in southern California bays (to where it was probably introduced in the ballast water of ships returning from Indonesia and southeast Asia during the Vietnam War) from its later discovery in San Francisco Bay. The latter invasion may be linked (Table 1, remarks) to an increase in *Theora's* population in regions which now supply large amounts of ballast water to the Bay.

In contrast to these complex dispersal histories, 2 bivalves have appeared in North America whose introduction is clearly linked to ballast water release. These are the Asian corbulid clam *Potamocorbula amurensis* and the Eurasian zebra mussel *Dreissena polymorpha*. *Potamocorbula* established large populations in San Francisco Bay in the 1980s (Carlton et al. 1990, Nichols et al. 1990), at the same time *Dreissena* was establishing large populations in the Great Lakes (Griffiths et al. 1991). *Dreissena* is included here by virtue of its spread into brackish (oligohaline) waters (Table 1). A second species of *Dreissena* (May and Marsden 1992), whose specific name remains unclear, also introduced by ballast water into the Great Lakes, has not appeared (as of November 1992) in estuarine environments in North America.

DISCUSSION

Regional Patterns and Mechanisms of Introduction

The striking differences between the number of molluscan invasions on the Atlantic, Pacific, and Gulf coasts of North America (Table 3) may be due to a combination of human-mediated dispersal events and regional geological and biological Pleistocene history. The two are difficult to separate.

A global mechanism for the potential introduction of nonindigenous mollusks to all shores is shipping. With the ebb and flow of human colonization and commerce, shipping has had a differential impact upon different regions at different times. Societal changes (the colonization of new lands, the opening and closing of ports due to political changes, the birth of new or the demise of old commodities, regional and world wars) and shipping changes (the replacement of wood with iron ships, increased vessel speed, the development of more effective antifouling paints, the advent of ballast water in the 1880s) have led to new invasions in largely unpredictable manners. Colonization and commercial shipping have occurred on a regular basis between Europe and Atlantic America since the early 17th century (or for about four centuries). While contact between Europe and Pacific America is just as old, regular shipping did not commence until the early 19th century, or about two centuries later (Carlton 1987). Despite this two century dichotomy, shipping does not contribute significantly to the regional differences in invasions between the Atlantic and Pacific coasts (Table 4).

A major mechanistic distinction occurs, however, in the history of commercial oyster movements to the two coastlines. Massive inoculation of the Pacific coast of North America for 60 years between 1870 and the 1930s with millions of tons of living oysters

(to be concluded in September 1993 NOTES)

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The Treasurer-Membership Chairman should be notified promptly of any change of address.

NEW YORK
SHELL CLUB
INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS - 1993 - 1994

PLEASE NOTE: There are differences in the date and place for the September and April meetings. The September meeting will be on Sunday, September 26 at 2 P.M. in the Blum Classroom at the Museum, and our April meeting will be on April 10, 1994, our annual Social/Auction. Consult the current edition of the NOTES for confirmation of date, day and time of each meeting.

September 26, 1993
October 10, 1993
November 14, 1993
December 12, 1993
January 9, 1994
February 13, 1994
March 13, 1994
April 10, 1994
May 8, 1994
June 12, 1994

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, except our Social/Auction (and the September meeting as noted above.)

On our meeting days, you may gain admission to the Museum without paying a fee by presenting your New York Shell Club membership card.

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September through June, in Room 319 of the American Museum of Naturak History, New York City (unless otherwise advised). Note that there is a change for our September meeting. Please present to NYSC membership card for admission to the museum on meeting dates.

PROGRAM SCHEDULE

SUNDAY, September 26, 1993 at 2:00 p.m. - Nick Katsaras will share with us his recollections of shells dealers. Please note the change in date, and we have been moved for this meeting to the Blum Lecture Room, on the 77th Street side of the building. Go into the Hall of Northwest Indians, and look for a sign that will take you left into the Blum Hall. If in doubt, ask one of the security guards or one of the information desk people.

SUNDAY, October 10, 1993 at 2:00 p.m. - Dr. Jon Greenlaw of the Long Island Shell Club will speak on diversity in the genus Strombus.

SUNDAY, November 14, 1993 at 2:00 p.m. - Rich Kelly of the Long Island Shell Club will present slides on the family Columbellidae.

SUNDAY, December 12, 1993 at 2:00 p.m. - Christopher Boyko, Scientific Assistant, Department of Invertebrates, AMNH, will speak on hermit crabs and how they select the shells they inhabit.

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HIGHLIGHTS OF RECENT MEETINGS

The May 9th meeting was the annual shell auction and social, held at Dorothy Jensen's Broadway Dance Studio, Astoria, Queens.

Sol Weiss again served as auctioneer and was assisted by Walter Sage and Harvey Frajlich. At 1 p.m. Sol offered the first of a number of shells and related materials that were not on the auction list, and then proceeded to the 125 listed shells, some in pairs and sets.

The most strongly contested items were: *Voluta bednalli*, which brought $35; *Voluta adcocki*, $30; a set of *Liguus pseudopictus*, $30; *Conus vittatus*, $25; *Strombus goliath*, $24; *Charonia tritonis*, 11 1/2", $23 and 14", $20; *Cardium hians*, $22; *Acteon eloiseae*, $20; *Voluta aulica*, $17. Shells that went for $16 included: *Guildfordia yoka*, *Altivasum flindersi*, *Chicoreus palmarosae*, *Harpulina arausiaca*, and two lots of *Chlamys rubida*, in sets of six, one in six different colors.

President Al Scarpetti again donated a quache drawing, created for the occasion. The door prizes were a shell drawing (a rendition of a *Nautilus* by Georgia O'Keeffe) and the book "Spirals from the Sea" by Safer and Gill. The sales table offered bargains before and after the auction, and the snack tables were busy throughout.

JUNE 13, 1993: In the annual election of officers and directors, the Nominating Committee recommended re-election of all incumbents, as follows:

President:	Al Scarpetti
Vice President:	Larry Potter
Recording Secretary:	Milton Werner
Treasurer/Membership:	Theta Lourbacos
Historian:	Nick Katsaras
Directors:	Fred Cannon, Walter Sage Allen Aigen, Ed Cowles

The Secretary was empowered to cast one vote for the re-election of the entire slate.

Walter Sage presented a brief report on progress in creation of the Sanibel Shell Museum. He then thanked Nick for having submitted to Shell Notes an article based on his reminiscences on shell dealers.

The door prizes were a copy of "Shells," by Roderick Cameron, won by Irv Hoppenwasser, and a copy of "The Edge of the Fossil Sea," by Edward J. Petuch, won by Romuald Czepulkowski.

The program presenters were Sue Hobbs and Phil Dietz, of the Jersey Cape Shell Club, whose subject was a recent trip to Gobernadora Island in the Golfo de Montijo, off Pacific Panama. The guest accomodations include cold running water, no electricity, a propane stove, and *no bugs*. Their slide photographs included views of these adequate quarters and of their excellent haul. They found the shoreline collecting good, and they dredged to 60 or 80 feet. In their close-up photos were *Natica*, *Cypraea*, *Murex*, *Bursa*, *Vasum*, *Crucibulum*, *Oliva*, *Terebra*, *Strombus*, *Turbo*, *Conus*, *Polinices*, *Phalium*, *Typhis*, *Marginella*, and *Ficus*. Among the bivalves were *Lophocardium*, *Transenella*, *Trigoniocardia*, *Cardita* and Veneridae. They put out a fine selection of specimens for grabs by everyone.

COA in Panama City Beach

by Dave Green

The 21st annual convention of the Conchologists of America was held at the Edgewater Beach Resort in Panama City Beach, Florida, July 11-17, 1993. The Gulf Coast Shell Club of Panama City was the host club and Jim & Linda Brunner were co-chairmen. The theme for this year's convention, "COA Comes of Age," was quite appropriate for the occasion.

Houston club members in attendance were Charles & Jean Roe, Jerry & Lucy Clampit and Dave & Lucille Green. There were some 310 additional registrants. Lucy is currently a Trustee on the COA Board of Directors and Lucille Green is the new Historian.

Conventioneers were treated to a wide choice of field trips on Tuesday, Wednesday, and Thursday. Separate wading, snorkeling, diving, fossiling, and freshwater collecting trips were scheduled each morning. The collecting on all of these trips was wonderful. The Panama City area is a prime collecting spot for all interests and types of collectors.

The annual auction was held on Wednesday night. The auctioneers were Al Deynzer, Dave Green, and Jim Brunner. The 106 auction items netted around $4400.00 and was as entertaining an evening as always.

On Thursday afternoon, the dealer's bourse opened to eager COA members and can best be described as a "Shark Feeding Frenzy". A wonderful smorgasbord of shells were offered for sale by over 25 US and foreign dealers. It was a super, fun-filled evening. The bourse reopened Friday morning and continued until noon.

The banquet was held on Friday evening. Dr. Rutiger Bieler of the Field Museum of Natural History in Chicago was the guest speaker. His topic was "A Farewell to Prosobranchs - An Inside Story". Following the program, Jim Brunner gave away several terrific door prizes. Dave Green won a beautiful matted photograph of a live *Cyphoma macginti*.

In the raffle Jerry Clampit won a exquisite *Perotrochus teramachii*. After winning the slit shell,Jerry said,"Now I have my first shell in MY collection!". Jerry also won the table decoration, a straw hat decorated with a shell hat band. This was really Jerry's lucky night.

It was a wonderful convention,filled with excitement, and loaded with things to do!!!!!!!!!!!

In 1994, COA comes to Texas for the first time. Next year the COA Convention will be hosted by the Coastal Bend Shell Club and "The Texas Connection". It will be held at the Marriott Bayfront Hotel in Corpus Christi July 17-23, 1994. Charlie and Jean Roe are the co-chairmen. Mark your calenders and plan to attend.

Y'ALL COME!!

(Houston Conchology Society Newsletter, August 1993)

SATURDAYS AREN'T FUN ANYMORE

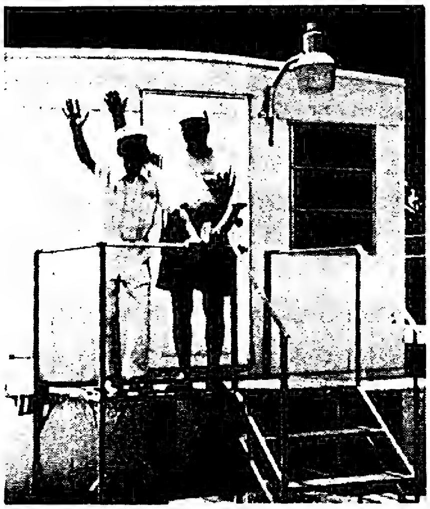
Margaret Thorsen

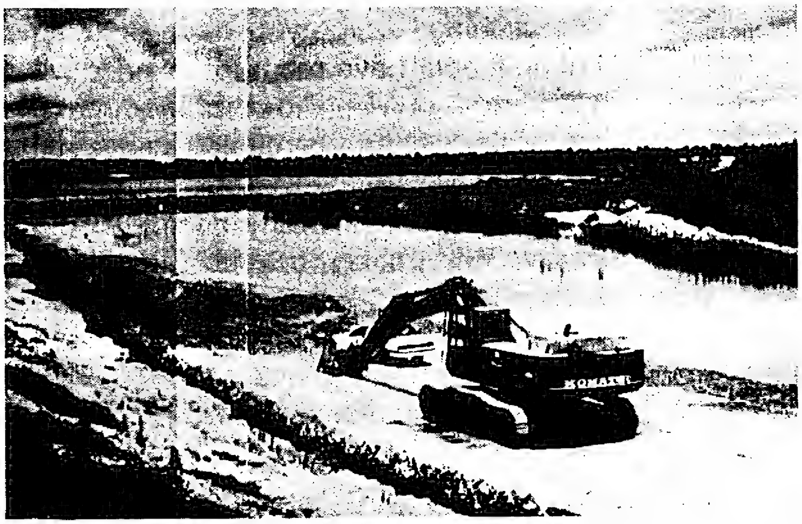
Back in the days when I was a college professor, I decided that the Registrar didn't like me. The classes I taught seemed, almost without exception, to be scheduled at 8 A.M. on M–W–F or T–Th–S. As if that wasn't enough, the Dean (who got up with the chickens) called his meetings for 8 A.M. Like it or not, I had to get up early until I retired. When I did retire and bought The Black Pearl and moved to Sanibel, I was in seventh heaven because the shops on Sanibel (at least in 1974) didn't open until 10 A.M. The plain and simple truth is – I'm a night owl. I seem to revive after the day's activities at about 10 P.M. and like to stay up late and read or work crossword puzzles. My usual bedtime is 1:30 A.M., give or take half an hour, and I like it that way. Then a few years back I was introduced to the fossil pits, and things changed. On one day of the week, Saturday, I became an early riser. On Friday night I loaded the van with my fossiling staples: my four–seat folding table and umbrella, buckets, padded kneeler, the weeding tool I use for digging, my pith helmet with the tiny fan in the brim, and my cooler which always contained a sandwich, a little jar of pineapple cubes, and my cinnamon–orange iced tea with 5 whole cloves. Then I went in, laid out my grubbies, set the alarm for **5:30 A.M.**, and went to bed. I picked up my buddies at 6:30, and by 8 A.M. we were either at the APAC pits in Sarasota or at the De Soto pits off Route 31. I have been a soggy, bedraggled mess in the 102 degree heat in the summer and have shivvered in the winter while wearing slacks, T–shirt, sweat shirt *plus* windbreaker. And when we arrived home at about 5 P.M. we looked as bad as we felt. But we all loved every minute of it, and we went through the same routine Saturday after Saturday. That one day a week of climbing and crawling and digging was a treasured ritual. We even had a Christmas Party each December in "the pits". We fossiled till noon and then put on Santa costumes, exchanged presents, and ate very special goodies made just for the occasion.

Now, there are no pits to dig in and Saturdays are not fun any more. We all knew that APAC was closing and we understood. They had no place to expand and had dug as far as they were allowed to go. APAC was a great place to fossil, and we were sad to see it close, but we still had the De Soto pits. Although we perhaps found a greater variety of fossils at APAC, digging was beginning in the new area at De Soto and we were eagerly waiting for that operation to get into full swing. Now, suddenly De Soto is closed to us. They have not closed down the operation, but they have closed the pits to fossilers. Since hurricane Andrew, work at DeSoto has slowed down tremendously because their trucks have been on the East coast helping to haul away the vast amount of rubble left by the storm. On most Saturdays, however, we would see the drag–line at work for a short period of time. About a month or so ago when we were at APAC, two bus loads of fossilers arrived at DeSoto and found the gate closed and locked and a NO ADMITTANCE sign on the gate. They ignored this, climbed the fence and proceeded to fossil. By chance, the owner of the property came by, saw the busses and the fossilers, and the rest is history.

He evicted the group from the property and made them leave behind the fossils they had collected. As a result of that incident, the DeSoto pit has been closed to all fossilers. I'm really upset - not just for myself but for all the fossilers who play by the rules. I certainly understand why the owner took the action he did, and it was the prudent thing to do. The responsibility and liability hazards of allowing us to climb and crawl and dig was a huge one. On the other hand, we always got permission (a ticket) or had season passes which we obtained from Steve Wilson, we were careful and kept an eye on each other, we had made friends with both truck drivers and drag-line operators, and we exited when we were supposed to. In other words, we had built up a firm, friendly relationship with the workers. They had only to look to see that we didn't take chances. We parked so as not to interfere with the work they were doing and their traffic pattern. Since we always got our permissions in advance, we would have known if the pit was to be closed on any particular Saturday. I really find it hard to understand the mentality of people who ignore rules which are dictated by safety concerns. When there are no members of the company workforce on the premises, it makes very good sense to lock the gates and post a no admittance sign. What right has any one of us to ignore it? How can any reputable club or organization send two busloads of fossilers without obtaining permission? Had they done so, they would have been informed that the pit was closed. There are alligators in those pits where we wade, there are holes to fall into, and there is dredge that can give way and slide. No clear-headed adult could possibly assume responsibility for allowing 2 bus loads of people to ignore the locked gate and the no admittance sign and climb that fence. But they did, and now we have no place left to fossil. The irresponsible behavior and trespassing of a few has lost the fossiling privileges (and it was a *real privilege*) for all of us - not only at La Belle and Mule Pen but now at DeSoto too.

Fossiling was more than just a fun outing. It was a whole new world for me. I never got used to the feeling of awe when I picked up a lovely cup-and-saucer shell or a murex with all its lacy fronds and realized that it had been buried beneath layers and layers of sand and mud for *millions* of years, then gouged out of the earth by a drag line and dumped onto a huge pile - and there it was, still intact, waiting for me to pick it up and treasure it. It was exciting to find chunks of coral of so many kinds, to find exquisite little clumps of barnacles, huge olives and tiny ones, as well, that still retain their sheen, and bivalves by the millions. We would sit at the picnic tables at noon, under the umbrellas, and share our finds of the morning while we mopped or shivvered. I don't think winning the lottery would be any more breathtaking than what I felt when I found my first *fluviana* or the perfect pair of scallops I waded out to get which measured 7 ". I still get excited when I find a trig or a special murex or a vasum with coral in it that makes it look like an ice cream cone. I love the big nutmegs and the tiny cones - in fact, there are very few of them that hold no interest for me. I enjoy the looking process, even if I'm not excited about what I find. I should have written those last few sentences in the past tense instead of the present. I miss the challenge of looking, the sharing of it all with friends. I miss the friendly wave we got from the drag line operator when we arrived and the friendly honk of the horn from the truck drivers as they arrived or departed. I can still pore over books in the library and struggle to identify what I have. I can still look for answers to all the questions that fossiling brought to mind. To keep on learning more about this new world that opened up for me will be an unending challenge. But it's not the same as *being there in the pit myself!* When you have a job and lots of other responsibilities, it isn't easy to find time to go to North Carolina or some of the other sites when one can still fossil. Those trips take more time than I can come up with. Whoever you are, I wish you hadn't spoiled things for the rest of us!!! Being Norwegian, I can say: Götterdämmerungit - **Saturdays aren't fun any more.** (There is no such word, but it conveys my feelings).





(THE JUNONIA, Sanibel-Captiva Shell Club, Inc., July, 1993)

NEWS RELEASE from Dr. R. Tucker Abbott, American Malacologists, Inc.

WORLD SIZE RECORDS CONTINUES! You are perhaps aware of the death in November, 1992, at the age of 84, of our friend Robert (Bob) Wagner, who spent so many years giving his services to the upkeep of "World Size Records." We shall miss him, but I am pleased and thankful to inform you that Mrs. Barbara Haviland will be carrying on his duties.

If you have sent in records since October, 1992, Barbara will process your reports and inform you of any new records.

We hope to issue a new list in early 1994. Meanwhile, all correspondence relating to World Size Records should be directed to Barbara: Mrs. Barbara Haviland, 6950 46th Avenue North, #51, St. Petersburg, FL 33709.

Copies of the 80-page 1990 WORLD SIZE RECORDS may be purchased for $9.00 (postage paid) from American Malacologists, P. O. Box 1088, Andover, MA 01810-0019.

We are pleased that the WORLD SIZE RECORDS is continuing to be popular and is receiving your support. We think it adds an interesting and useful dimension to conchology. Any comments can be addressed to Mrs. haviland or to Co-Editor R. Tucker Abbott, P. O. Box 2255, Melbourne, FL 32902-2255.

IN MEMORIAM, Elsie Malone

Many long-time shell collectors and those who have visited Sanibel have known Elsie Malone, her husband Dan, and daughter Elsie. For a number of years, the Malones operated one of the two shops on Sanibel devoted to specimen shells. (The other was Edie Mugridge's Glory of the Seas shop, now the Preview Center for the new Bailey-Matthews Shell Museum). For several years Elsie and her daughter lived in retirement in Fort Myers, Florida, a short distance across the causeway from where they supplied so many collectors with shells and were a vital part of the southwest Florida shelling community for many years.

We are sad to report the Elsie, Senior died on July 9, 1993 at age 84. She is survived by her daughter Elsie, to whom we send our sincere condolences.

CONCHOLOGISTS OF AMERICA SPECIAL PUBLICATIONS AVAILABLE

The Conchologists of America has recently issued two special publications which we would like to call to the attention of members of the New York Shell Club.

As you know, the COA is an international, not for profit, society of shell collectors devoted to increasing public interest in the fascinating hobby and science of conchology.

The first COA Special Publication is a 20-year Index to American Conchologist, our educational and informative quarterly magazine. All the articles are indexed; every species mentioned is included; every contributor, every COA trophy winner, every individual mentioned is indexed. The Index includes all articles from the COA Bulletin, American Conchologist's predecessor publication, covering the period from 1972-1991.

The second work is a History of the COA, from its founding in 1972 to the events of 1991. Officers for each year are included as are details of the annual convention and yearly activities such as financial grant winners, and the origins of many of our now traditional convention activities.

The Index is available for $4.00 and the History for $2.00, both postage paid from COA property Manager Hank Foglino, 4 Trent Court, Smithtown, NY 11787-1266. Checks should be made payable to COA. Information on joining COA can be obtained by writing COA Membership Director Bobbie Houchin, 2644 Kings Highway, Louisville, KY 40205-2649. Membership is $12.50 for an individual for the calendar year.

MICROWAVE CLEANING OF SHELLS

by Jean Ryser

In this article I am going to list procedures I use for cleaning live shells by using the microwave oven. Of course, this is by no means to be construed as THE way for you to handle your shells, but merely to set forth a great method that has worked well for me.

Timing, of course, depends on the size of the shell, but also depends on whether or not you have a high or low powered unit. I purchased a very inexpensive unit solely for processing shells. My unit does not have the "punch-in" time settings (which seem to require less time), but has the "dial" which you turn to set the time. I have used both types.

First, the shells are put onto a paper plate and I place a paper towel loosely on top of the shells, the insert the paper plate, shells and covering paper towel into the microwave unit.

TIMING: For small shells (nerites, naticas, periwinkles, turbans, distorsios, etc.) number of shells - 8 to 10; time: Punch-in units - 50 seconds; dial units - 1 minute.

For medium shells (hawk-wing conchs, tulips, bonnets, cones, etc.) Number of shells 3; time: Punch-in units - 50 seconds; dial units - 1 1/4 minutes.

For large or extra-large shells (tulips, queen conchs, horse conchs, helmets, etc.) number of shells - 1; time: punch-in units - 1 1/4 minutes at a time, up to 3 3/4 minutes; dial units - 2 minutes at a time, up to 6 minutes.

Some extra-large shells may require additional time as indicated above. On these, I start at the first level given, and if the animals do not come out with a good "tug", I immediately re-do them. I have used six minutes on large queen conchs, doing them two minutes at a time, using the dial unit.

Remember this method works for LIVE shells. For shells where the animal has begun to deteriorate, you can use the microwave, but will, in many cases, end up having to soak or rot out some of the remains, although it probably would not take as long as not microwaving them.

When removing the shells from the microwave, use a wet paper towel to handle them. After removing the animals, flush the shells with tap water. IMPORTANT - you must remember that each animal has a small spiral tip that can easily break off when you remove the animal. MAKE SURE this spiral tip is out of the shell. If it has broken off inside the shell, flush and shake the shell until it comes out - unless this is done, your shell is not cleaned and you'll be back to soaking (or have a smelly shell.) This happens frequently with tulips.

After the animal is removed, I place the shells and their operculums on a paper towel. When the microwaving is done, I brush the shells with a toothbrush under the tap water and replace them on the towel with the proper operculum. To remove any algae present and sanitize the shell, I then pour clorox into a deep base glass bowl, enough clorox to cover the shells and line up the shells in the bowl to match up with their operculums on the paper towel (do not put operculums in clorox). The timing on the clorox is 10 minutes - no more. I have found that 10 minutes will not hurt any shell and in most cases will remove all the algae. The shell is then rinsed thoroughly and blotted with a paper towel and replaced near its operculum. When all shells are done, I brush them generously with baby oil, using a small paint brush. A few hours later, I examine the shells to see if any needs more attention, and finally glue the operculum on a cotton plug and place in a natural position in the aperture of each shell.

(The Busycon, Broward Shell Club, Inc., September 1985)

NYSC NOTES would welcome your thoughts on cleaning shells, making labels, and anything to do with preparing shells for your collection. Let us hear from YOU.

Correction and Amplification by Walter Sage

In typing the most enjoyable article by Nick Katsaras for the June NOTES, I made one very noticeable error (Nick says there was an even worse error in another section of his article, and hopefully he will correct that in his presentation at the September meeting). I typed that Hano's establishment began as a general store in 1980, when the statement should have read 1908. NYSC member Israel Bendersky pointed out my error, remarking that Hano had died in the late 1960s. I decided to see if there had been an obituary in our NOTES. I located NOTES no. 156, which includes an obituary of Hano by Bill Old, and I've decided to reprint this short note, to acquaint others with a well-known New York dealer.

"Mr. Philip Hano passed away on October 30th [1969]. He had celebrated his 80th birthday on October 5th. Though in declining health, he was actively engaged in dispensing shells until the middle of October. Mr. Hano had been a business man nearly all his adult life. In recent years he operated a curio shop, stocked with African carvings, ceramics, brassware, coins, and assorted trinkets. About 1963 he became interested in specimen shells; he joined the New York Shell Club in October of that year.

At age 75 he began learning scientific names, localities, and sources of shells. At one time he mentioned 'writing 75 letters a week to obtain shells'. His first specimens came from the Philippines; later he received shells from Formosa, Zanzibar, Brazil, Australia, New Zealand, and many other areas. Many of his most remarkable specimens came from Formosa, or Taiwan, as it is often called.

Among the shells he introduced to collectors were Conus stupella, Lyria kurodai, Murex alabaster, Calliostoma formosense, and Cypraea pulchella. Among shells that had been rare, or not available for many years, were Mitra zonata, Cypraea marginata (West Australia), Voluta bednalli (Torres Straits), Cypraea mus (Venezuela), Turbo jourdani (South Australia), Conus coccineus (Philippines), Conus adenensis and Cypraea pulchra (Arabia), Marginella lilacina, Ancilla lienardi, and many others from Brazil. These and many more species were handled at the shop on 89th and Third Avenue. Philpi Hano's sojourn in shells was brief and meteoric. His business is being liquidated, but he will not be forgotten by the shell world."

Quagga Mussel - Stowaway from the Ukraine New York TIMES, 8/17/93

The quagga mussel, a mollusk found in the northern waters of the United States, turns out to be a native of the Ukraine, according to scientists at Cornell University. Native to the Ukraine's Bug and Dnieper Rivers, this bivalve is now known from North America's Lake Ontario, Lake Erie and the St. Lawrence River.

The mussel's black shell is striped with white, so it has been mistaken for the zebra mussel, known for clogging industrial water pipes and machinery in the Great Lakes and other waters that drain from the Great Lakes. Quagga mussels thrive in the deeper, colder water of Lakes Ontario and Erie, too cold for the zebra mussel. Between them, the two types of mussels could cover more diverse habitats, and therefore larger areas, than each could individually.

Both species are suspected to have traveled to North America in ballast water, which is drawn into vessels at the start of a journey and stored in the bottom of the ship to keep it stable. Analysis of animal protein's determined that the mussels from the Ukraine are the quagga mussels, not the more frequently mentioned zebra mussels. Both species are capable of displacing native mollusks, and can occur in almost unbelievable numbers. On the positive side, they are credited with reducing pollutants and excessive algal growth in waters where they occur.

Walter Sage was recently collecting freshwater mollusks in the Finger Lakes region and personally noted the huge concentrations of zebra mussels in Lake Erie and the Erie Canal. Every possible surface was thickly coated with mussels where they occur.

HISTORICAL NOTES ON THE NOTES by Morris K. Jacobson

[I recently came across this interesting article originally printed in NOTES, no. 200 and thought that other NYSC members might enjoy reading it - WS]

The first issue of the NOTEScame to be in this manner: I had been working in a sign painter's shop while an undergraduate. One of our customers was unable to pay his bill and went broke. In the distribution of his assets, my sign painter boss was left a small, primitive mimeo machine and a small supply of paper and ink. When I left his employ after graduation, he rewarded my faithfulness with the machine since he couldn't get it to work properly and didn't need it anyway. It stayed in my attic for about ten years and was finally put to use in December 1949 when No. 1 of the NOTES rolled off its press. Thus if I hadn't painted a sign and if the customer had not gone broke, there could very well have been no NOTES, at least in 1949.

The numbers appeared irregularly at rather brief intervals - as long as the paper and ink lasted. There was, however, so long a gap after No. 5 (October 1951), that the succeeding issue (March 1952) was mistakenly designated No. 7. The editor, typist, runner0offer, assembler, addresser, and mailer had all of them forgotten that no No. 6 had appeared.

Other numbers appeared thus listlessly until No. 9 (November 1954) when Dr. and Mrs. Wisoff bought the club a splendid new machine and all the paper and ink needed. The NOTES now began to appear more regularly and more frequently. In 1955 and 1956 nine numbers appeared; after that they were increased to the present ten. The Wisoff machine worked fine for a while and then, like all gadgets, became temperamental. In November 1959 a new machine was purchased and delivered to the home of Anthony D'Attilio in Valley Stream; we paid cash, reducing the treasury to $2. We remember, because we had to take turns collecting for money paid out for stamps, envelopes, paper, etc. until Miss Weingartner collected dues. By now a lively group of workers assembled monthly at Tony'd to "get out the NOTES." When Tony moved from Valley Stream, The NOTES and the labor-gang transferred to Grace McDougall's basement in New Hyde Park. When she moved to Florida, it was a "new" (actually a reconditioned) machine that completed the circle and went back to Karl Jacobson's in Rockaway. On KJ's retirement, Frank Nelson volunteered to set it up in the attic of his newly purchased home in Richmond Hill, where it was moved in November 1973. [date of this article was March 1974]

Efficiency was greatly increased when Grace obtained at a minimum expenditure some addressograph equipment from her office. Before that all addressing had been done by hand by Josephine Wichern. But she had to give up when the number of subscribers rose to 200. Many other people worked getting out the NOTES, too long a list to be included here. But if the author of this report founded the periodical, he is the first to admit that if it were not for the skill, devotion, meticulous attention to detail, and initiative of Dorothy Raeihle - with the expert assistance of George Raeihle - not only would the NOTES not have been as good as they were; they might very well not even have survived at all.

Many others also helped by contributing items to the paper. One of the most indefatigable was Tony D'Attilio, whose beautifully illustrated series called "Some Rarer Shells" and frequent articles on Conus and Murex did much to enrich the pages of the early NOTES.

Nearly 20 years have passed since Karl Jacobson wrote this article. A number of faithful NYSC members have passed on, and others have come forward to carry on. Dorothy Raeihle's dedication has been an inspiration to the current editor, and he extends appreciation for all her past and continuing efforts. Many others, including Bill Old, Bob and Dottie Janowsky, Mike Werner, Theta Lourbacos and other NYSC officers and members deserve the thanks of us who follow in their steps.

THE QUEEN AND I

by Victoria Punnett

I don't have friends in high places, but I do have friends in interesting places. One such friend is Melody Ray, a marine biologist studying the queen conch at the Caribbean Marine Research Center (CMRC) on Lee Stocking Island in the Exumas, Bahamas. The Benthic Ecology Program at CMRC is addressing a host of questions concerning the queen conch to determine why they are where they are.

Melody invited me to visit her for a week last spring, and it was a delightful opportunity to experience life on a remote, sparsely-populated Bahamian island, and learn about the queen conch, Strombus gigas Linnaeus, 1758. The queen conch has reigned for 65 million years as the most celebrated mollusk in the Caribbean. She is a blue-blood in the truest sense, the high copper content of her body producing a light blue blood. I had become slightly familiar with this mollusk some months earlier in Spanish Wells, and I was eager for this chance to learn more.

Although live shelling was forbidden withing a quarter of a mile of Lee Stocking, my experience there was nevertheless a sheller's delight. In addition to having ready access to Melody's knowledge, I was permitted to come to the lab and read the research materials that had been compiled by the center. I was able to glean quite a bit of information about the queen conch, and am happy to pass it on here.

The queen conch is reproductively active in the Bahamas from April through September and it produces around six egg masses a year. Mating is initiated by an amorous male who approaches the female from behind. He uses suction to hold onto her shell lip with his foot while he extends his verge into her vaginal fold. Mating conchs are typically found in pairs, but, occasionally, several males will gather around a single, spawning female. Mating may actually occur during spawning, the sperm being store for later fertilization.

Spawning occurs about three weeks after mating. It takes 24 to 36 hours for the conch to produce her thin, sticky, gelatinous egg strand, and she neither eats nor sleeps until the job is done. The egg strand when stretched out is about 100 feet long. She forms it into a crescent 4-6 inches long, places it in a slight depression in the sand, and then abandons it. It contains up to 750,000 eggs.

Three days after the formation of the egg mass, the embryos have grown large enough to break out of the casing. They are now free-swimming larvae called veligers. Each veliger is about the size of a pinhead, has a tiny transparent shell called a protoconch, and propels itself with velar lobes - first two, then four, and finally six. Veligers lead a life of adventure, drifting wherever the tides and currents take them - often miles from where they were hatched, feeding on phytoplankton (microscopic drifting plants), and hoping to avoid being eaten by copepods, shrimp, jellyfish, squid, or fish. Very few survive this adventure.

After about a month of this perilous journey, the veliger metamorphoses from a pelagic (free swimming) to a benthic (bottom dwelling) organism. It drops to the bottom, absorbs its lobes, and has a proboscis and operculum on its tiny foot. This wee youngster, camouflaged with streaked and mottled coloring and with fine silt and debris clinging to its back, buries itself in the sand, coming out only at night to feed on algae. It hides so expertly that very little is really known about this stage of development. Individuals of less than 50mm are rarely seen, and lack of information about conchs younger than a year old is a serious obstacle to preserving this overfished species.

Habitat associations were tested with transplant experiments. Juveniles which were transplanted to a deep sand and macroalgae site buried themselves immediately upon release. Those which were transplanted to a shallower seagrass site continued on the surface of the sand, apparently finding shelter among the seagrass blades. It seems likely, therefore, that conchs use different strategies of defense depending on their environment.

At Neighbor Cay, located north of Lee Stocking, observations indicated that less than 30% of the early juveniles were on the surface during the day, while 100% were on the surface at night. The conchs buried before sunrise and surfaced before sunset. Accordingly, the role of light stimulus on burial behavior was determined by a laboratory experiment.

Hatchery-reared conchs (38.7-52.6mm) were placed in 190 liter aquariums, 10 in each tank. Tank one received light on the natural cycle. Tank two was kept in continuous darkness. Tank three was kept continually lighted. Observations were made daily at 4:00 a.m., 11:00 a.m., 3:00 p.m., and at midnight. Juveniles exposed to natural cycles of light continued to bury during light and emerge in darkness; juveniles kept in constant darkness buried much less frequently, and their burial pattern became more erratic as the experiment progressed; those exposed to constant light continued to show natural rhythms of activity, surfacing and burying on the light-entrained schedule.

Early juvenile conchs appear to have considerable behavioral flexibility in defense against predators, but despite this, there is evidence to suggest that 50-60mm may be a particularly vulnerable period in the life of a queen conch. First, individuals smaller than 60mm are rarely found even in areas well-established as important nurseries. Second, shell breaking strength is relatively low up to 55mm, so the 60mm individual has just passed through a stage of high vulnerability. And finally, this is the stage at which the juveniles migrate to vegetated habitats, and they are completely exposed during the period of habitat shift.

The discovery of the early juvenile population at Neighbor Cay was fortuitous because normally one does not see a conch until it is 50-75mm in length and just past its first birthday. During the next year, the conch stops burying itself, starts taking on the coloring we associate with this species, and doubles in size. At around 150 mm in length, this juvenile is called a "roller" until maturity.

Approximately three years from the time of spawning, the roller reaches its adult size and begins to develop the beautiful and distinctive flared lip. It takes another four months before it reaches sexual maturity.

As the conch gets closer to the end of its life span (six to seven years or longer) the queen takes on a very different appearance. With the years, its shell has become much thicker, its spines have worn away almost completely, and its pink and cream lip has become grey or black. So altered is its appearance that it was once unrecognized as Strombus gigas and was thought to be a separate species: Strombus samba Clench, 1937. We now know this named form to be merely an aged S. gigas.

A juvenile conch is prey to turtles, snappers, groupers, triggerfish, stingrays, nurse sharks, wrasses, tulip snails, spiny lobsters, hermit crabs, and the octopus. Once a conch approaches maturity, it has "outgrown" many of its predators. Its shell is too thick to be easily crushed, and it can often "outrun" a hungry tulip snail. However, starfish can wedge an arm between the conch's operculum and the shell opening. Then, having prevented the conch from withdrawing, it everts its stomach and digests the meat.

Adult conchs are still preyed upon by octopuses, loggerhead turtles, and stingrays. The octopus uses its venomous bite to paralyze the conch so it can be pulled easily from its shell. The loggerhead's strong jaws can crush an adult conch's shell, and the southern stingray hasbeen seen to flip the conch upside down and bite off its foot as the conch tries to right itself. But one predator of adult conch is unsurpassed, and that is man.

(The Junonia, Sanibel-Captiva Shell Club, Inc., October 1992)

Strombus gigas is a protected species in Florida - not permitted to be collected.

SLUG BEAUTIES

by Stacy Trevenon

Slugs can be beautiful - no really, they can! When most of us think of slugs, we think of the ones that live in backyard gardens. They're gray, slimy and not exactly a treat to look at. But in the underwater garden community of a coral reef, there are colorful, beuatiful, and even dazzling sea slugs called nudibranchs. They can be gaudy, spotted, or just plain bright. Their lungs, livers and digestive systems are often on the outside of their bodies. Some defend themselves with stingers "borrowed" from their prey. Some can be found hanging upside down... from the surface of the water!

There are two main groups of nudibranchs: "dorids" and aeolids". A dorid is broad and flat, with a flat "foot". An aeolid is smaller, long and narrow, with a flat "foot" on its underside and tentacle-like cerata on its topside. These cerata contain part of the liver and digestive glands. "Nudibranch" comes from the Latin words for "naked lung," becuase the breathing organs for both dorids and aeolids are on their outsides.

Nudibranchs can be found munching sponges or sea anemones near coral reefs, climbing through kelp forests, or moving across the bottom of tidepools. In open areas or in rough weather, nudibranchs might hide under rocks. If the water is calm, they might stroll along the ocean floor like inchworms, squeezing and relaxing the muscles of their feet. Some "paddle" with tiny hair-like body parts called cilia on their feet. Smaller nudibranchs can hang upside down from the surface.

These flamboyant ocean slugs are also equipped for getting around when they need to. The long, pointed foot of the aeolids lets them easily climb stalks of hydroids, animals that look like plants. The dorid's broad foot gets a solid grip on flat sponges. What's even better is that the things nudibranchs like to climb are often the things they like to eat.

Some nudibranchs have feelers called rhinophores that look like horns, and are used to taste and smell. A nudibranch may use these rhinophores to sniff out food or mates, and when it's through, it can withdraw them into its body.

The old saying "You are what you eat" is nowhere more true than with nudibranchs. In many cases, the sea slug's color comes from the color of its prey. One species becomes the blue color of its favorite sponge. The rosy nudibranch takes on the pink shades of creatures called bryozoans. As far as scientists know, all nudibranchs are carnivorous, eating animals, not plants. They have tiny rasping teeth on the undersides of their bodies.

Nudibranchs are unusual predators because they move so slowly. Fortunately, their prey - barnacles, sponges, tiny snails - are slower than they are. But their predators are often faster. Since sea slugs are brightly colored and have no protective shells, they are easy targets for predators such as sea stars. But they have adapted to their shell-less life with many ways to protect themselves.

The patterns and bright colors of nudibranchs often act as signals to their predators that these slugs don't taste good. Some protect themselves like skunks, by excreting milky, acidic or strong-smelling substances that make their predators back off in a hurry.

Certain aeolids simply help themselves to the paralyzing stingers of the sea anemones or corals they eat. The stingers pass harmlessly through the aeolid's stomach and are stored in tiny sacs in the tips of the cerata. Hungry predators are stungs as the cerata "fire" threads containing small doses of venom.

The young slugs are choosy in picking their homes, settling down only when and where they find the prey they will eat for the rest of their short lives. Aeolids live for only six weeks or less and lay eggs several times. Dorids live a year or so and reproduce only once. (Cousteau Society's "Dolphin Log", July 1993)

DANGER ON THE HALF SHELL (FDA Medical Bulletin, March, 1993)

Eating raw or undercooked clams, oysters, mussels or whole scallops can be hazardous for people whose underlying health problems make them vulnerable to bacteria in the genus *Vibrio*. Healthy people who ingest a morsel of bacteria along with a mouthful of mollusk are usually none the worse for wear: stomach acid destroys most of these organisms immediately, and the survivors are soon neutralized by the body's immune system.

Unfortunately, diabetes, some types of liver disease, certain gastrointestinal problems, and HIV infection or other conditions that damage the immune system can significantly increase the risk for *Vibrio*-related illness. Some medications (including anti-ulcer drugs that suppress gastric acid secretion, corticosteroids taken for an extended period, and chemotherapy for cancer) and radiation therapy can also increase susceptibility.

The Food and Drug Administration (FDA) estimates that 5-10% of raw mollusks coming to market are contaminated with *Vibrio*. When these bacteria proliferate in susceptible people, they typically produce fever, chills, diarrhea, abdominal pain, nausea, and vomiting. Soemtimes the outcome is lethal: nine people who ate *Vibrio*-tainted oysters in Florida died between April and December of 1992.

The FDA recommends that mollusks be consumed only if they are thoroughly cooked. If they are not eaten right away, cooked shellfish should be stored at a temperature below 39 or above 140° F. and kept separate from uncooked seafood. Despite the fondness that some gourmets feel for raw tidbits, the dangers of *Vibrio* infection lend new weight to the humorous injunction "never to eat anything that swallows faster than you do."

ILLEGAL CHILEAN SHELLFISH RETAINS ITS APPEAL by Nathaniel C. Nash

Chile banned the fishing of locos (the muricoidean gastropod *Concholepas concholepas*) after the populations in important areas had dropped up to 80%. Yet the business continues to thrive, mainly because of the appetite for the so-called Chilean abalone in Japan, Hong Kong and Taiwan, where consumers pay at least $3 for each of the three-ounce mollusks.

One reason that demand is so high in Japan and other countries is that Chilean locos, though considered inferior to Japanes abalone in texture and taste, are one-fourth the price. Some restaurants serve them raw as an inexpensive sushi, but mostly they are canned in soy sauce.

The demand has its dark side. Organized-crime rings have formed to trade locos. The authorities say the groups have ties with drug dealers in Peru and Mafia families in Hong Kong and Japan. Some 25,000 tons of locos worth an estimated $45 million are shipped to the Pacific Rim each year.

Researchers say the pursuit of locos endangers the species. Locos have not been classified as endangered because the Chilean government has no reliable figures on their total population. Japan and other countries began buying locos 20 years ago, but the effects of overharvesting were not realized until the late 1980's. In 1989 a ban on harvesting was imposed, but little enforcement has taken place.

But it is the drug connection that seems to concern the authorities here the most. Chile has reported a marked increase in drugs entering the country in the 1990's.

Narcotics officials say that locos, whose price in Peru is three times what it is in Chile, are exchanged for cocaine delivered by Peruvians. In May 1991, police confiscated about $1 million in cocaine and almost 2,000 locos in a raid near the northern Chilean city of Tocopilla. This sort of illegal activity is expected to continue until the governments involved enforce the ban on collecting locos.

TABLE 4.

Introduced marine and estuarine mollusks: Mechanisms of introduction of established species (M) in parentheses indicates one of two possible transport mechanisms; see key, Table 1 footnote.

	To:		
	Atlantic Coast	Pacific Coast	Gulf Coast
MECHANISM			
Shipping: Fouling/Boring	*Mytilopsis* (BW) *Teredo*	*Mytilus* *Geukensia* (COI) *Lyrodus pedicellatus* *Teredo* (2 spp.)	*Perna* (BW)
Shipping: Solid Ballast	*Littorina* (IR) *Ovatella*		
Shipping: Water Ballast	*Rangia* (**) *Mytilopsis* (S) *Dreissena* (*)	*Theora* *Potamocorbula* *Musculista* (COI)	*Perna* (S)
Commercial Oyster Industry	*Rangia* (**)	*Cecina* *Batillaria* *Crepidula* (3 spp.) *Ceratostoma* *Urosalpinx* *Busycotypus* *Ilyanassa* *Nassarius* *Ovatella* *Geukensia* (S) *Musculista* (BW) *Macoma* *Trapezium* *Venerupis* *Gemma* *Petricola* *Mya* *Lyrodus takanoshimensis*	
Intentional Release	*Littorina* (SB) *Ostrea* *Corbicula* (**)	*Crassostrea* (2 spp.) *Venerupis* (Oregon) *Mercenaria* *Corbicula* (***)	

* *Dreissena* was transported to North America in ballast water from Europe (Carlton, 1992b), but its occurrence in the oligohaline zone of the lower Hudson River is probably due to natural transport as larvae or as juveniles on floating materials from the upper River basin.

** *Rangia* may owe its reappearance on the Atlantic coast in Holocene times either to the transportation of oysters from the Gulf of Mexico to Chesapeake Bay or to its transportation as larvae in ballast water from the Gulf. Ballast water is the probable mechanism of its recent introduction to the oligohaline portions of the Hudson River. Genetic analyses would be of interest to establish whether the Hudson River population originates from the Atlantic coast (such as Chesapeake Bay) or the Gulf coast, if indeed these potential parental populations are genetically distinct.

*** *Corbicula* was probably transported and released intentionally in Western North America no later than the 1920s–1930s (perhaps in more than one incident); subsequent dispersal from western to eastern America has been both through anthropogenic means (the use of the clam as bait, for example), and by natural dispersal along water corridors.

from Japan and from the Atlantic coast led to the simultaneous unintentional inoculation of scores if not hundreds of species of associated protists, invertebrates, algae, seagrasses, and perhaps fish. No such introductions of exotic oysters on this scale occurred on the Atlantic coast of North America.

As a result, 27 species of Asian and Atlantic mollusks have become established on Pacific shores. The bays and estuaries of the Pacific coast where these species are established are geologically young (recently flooded, <10,000 years old) and do not have a diverse native biota, suggesting that these systems were relatively susceptible to invasion (Carlton 1975, Carlton 1979b, Nichols and Thompson 1985). Only one introduced species, the Mediterranean mussel *Mytilus galloprovincialis*, occurs in open coast, high energy environments on the Pacific coast; all remaining species are restricted to bays and estuaries. While the extraordinarily diverse molluscan fauna of these open coast rocky shores may thus, in turn, resist invasion, few human-mediated mechanisms serve to transport rocky shores species, and it may be that few if any non-indigenous species from comparable habitats around the world been released into these communities. Thus, on the Pacific coast, there was an apparently coincidental combination of biotically depauperate regions subjected to invasions by a transport mechanism that served to bring species appropriate to those habitats from other regions of the world.

It is of interest to note that in a parallel sense the most significant molluscan invasion of the Atlantic shore also occurred in a geologically young (recently deglaciated, <10,000 years old), biotically depauperate environment. The European periwinkle *Littorina littorea* invaded hard and some soft bottom intertidal communities of the Atlantic coast in the presence of relatively few native herbivorous or omnivorous gastropods. Why, however, other western European rocky shore gastropods failed to colonize American Atlantic shores during centuries of intensive shipping is not clear. It may be that European populations of the common periwinkle *Littorina saxatilis* have been mixed in with aboriginal populations and thus gone undetected. However, it is clear that a variety of other small to medium size European snails (such as trochids and patellid limpets) either were not introduced or were not successful. Here again transport mechanisms may have been rare, with little solid (rock) ballast originating from these habitats (which may suggest that ballast rocks may not have been the means of introduction of *Littorina littorea* to America).

The near absence of recorded introduced mollusks in the Gulf of Mexico may be linked, as with the Atlantic coast, to the absence of large scale importations of commercial oysters or other shellfish from other regions. Pre-ballast water shipping contributed few or no clear introductions, although a detailed biogeographic analysis of the shipworms of the Gulf of Mexico would be of interest. The recent appearances of the South American fouling bivalves *Mytella* and *Perna* in Florida and Texas may suggest that the global increase in ballast water-mediated invasions (Carlton 1985, 1987) may be an active mechanism that will add to the non-indigenous mollusks of the Gulf. The movement of the zebra mussel *Dreissena polymorpha* down the Mississippi River and its arrival (perhaps by 1993) in the oligohaline waters of that delta will add a second species to the list of Gulf marine and estuarine invasions.

Ecological Impacts

With the exception of a few species, there is little experimental elucidation of the ecological impact of the introduced marine mollusks in North America. Carlton (1979b) reviews general ecological considerations, including a remarkable, albeit anecdotal, early account of the interactions between the introduced Atlantic marsh mussel *Geukensia demissa* and the California clapper rail. Nichols and Thompson (1985) document the persistence of an "introduced mudflat community" in San Francisco Bay, where all of the mollusks are introduced (*Macoma "balthica,"* indicated as native in their paper, was later shown to be a probable introduction to the Bay (Meehan et al. 1989)).

Remaining largely uninvestigated is the alteration of benthic community dynamics by the abundant introduced bivalves on the Pacific coast, such as *Mytilus galloprovincialis, Geukensia demissa, Musculista senhousia, Mya arenaria, Crassostrea virginica, Venerupis philippinarum,* and *Gemma gemma.* All of these species can occur in great densities. Certain community-level interactions for some of these species (such as *Geukensia, Mya,* and *Gemma*) are known in their donor regions, but are applied with difficulty to the Pacific coast where different suites of potentially interacting species occur. Only the most recent bivalve introduction, the Asian clam *Potamocorbula amurensis,* has been the subject of intensive observational studies relative to its rapid predominance in certain parts of San Francisco Bay, reaching densities of >10,000 per square meter at sites where the former biota has become rare or absent (Nichols et al. 1990). *Potamocorbula* thus joins *Mya, Musculista,* and *Gemma* as species potentially critically important in regulating phytoplankton dynamics in the Bay (Carlton et al. 1990).

On the Pacific coast and Atlantic coasts, interactions between several pairs of native and introduced gastropods have been examined. Interactions between the introduced European periwinkle *Littorina littorea* and native gastropods on the Atlantic coast have been studied by a number of workers. In experimental studies, Petraitis (1989) found that *Littorina littorea* negatively affected the growth of the native limpet *Tectura testudinalis.* Yamada and Mansour (1987) also experimentally demonstrated that *Littorina littorea* can depress the growth rate of the native rocky shore snail *Littorina saxatilis.* Brenchley (1982) documented that *Littorina littorea* was the most abundant consumer of eggs of the native mudsnail *Ilyanassa obsoleta* in mid-intertidal habitats on the Atlantic coast. Brenchley and Carlton (1983) further demonstrated that there has been a historical change in the distribution of *Ilyanassa* due to competitive exclusion by *Littorina littorea,* with microhabitat displacement in the mid intertidal zone of 70% of *Ilyanassa,* calculated from littorinid removal experiments. *Littorina* also limits both the upper and lower distribution of *Ilyanassa.*

On the other hand, Race (1982) found that the Atlantic *Ilyanassa obsoleta,* introduced to San Francisco Bay, in turn limits the distribution of the native mudsnail *Cerithidea californica,* by means of competitive interactions and by predation on *Cerithidea*'s egg capsules. Whitlatch and Obrebski (1980) found that while the introduced Japanese snail *Batillaria* and the native Pacific coast snail *Cerithidea* can be sympatric in Tomales Bay, CA, similar-sized individuals exclude each other when feeding on the same size diatoms.

Berman and Carlton (1991) examined the potential interactions between the introduced Atlantic marsh snail *Ovatella myosotis* and the native Pacific coast marsh snails *Assiminea californica* and *Littorina subrotundata.* No observational or experimental evidence of competitive superiority by *Ovatella* could be found, and they concluded that the establishment of the introduced species in high shore, semiterrestrial environments did not arise at the expense of the native species.

While the introduced freshwater bivalves *Corbicula fluminea* and *Dreissena polymorpha* have had and are having profound impacts on the communities in which they have invaded (references in Table 1), ecological interactions of these species in brackish water remain largely uninvestigated.

Perhaps no introduced marine mollusk in North America has had a greater impact than the periwinkle *Littorina littorea,* which colonized most of the Atlantic coast from Nova Scotia to New Jersey in only 30 years, between 1860 and 1890 (references in Table 1). Perhaps because little or no economic impact has been associated with this invasion, it has attracted relatively little notice globally as a classic example of an invasion, aquatic or terrestrial. *Littorina* has fundamentally altered the distribution and abundance of algae on rocky shores (references in Table 1), altered hard-bottom, soft-bottom, and salt marsh habitat dynamics (Bertness 1984) negatively interacted with native gastropods (reviewed above), dramatically altered the hermit crab shell resource (providing an abundant larger shell) and modified shell utilization and preference patterns of the native hermit crab *Pagurus longicarpus* (Blackstone 1986), and as grazing herbivores and vacuuming omnivores, may have important impacts on a wide variety of small invertebrates, such as barnacles, whose newly settled larvae are consumed in large numbers (see "Life Habit" review in Brenchley and Carlton 1983).

In summary, all but the snail *Ovatella* of the abundant species of introduced mollusks that have been studied have been shown to have dramatic impacts on the pre-existing structure of the communities in which they have invaded. These results would suggest that the extensive populations of those species not yet studied may also have had, or are having, substantial impacts on population dynamics and interactions among co-occurring species, both native and introduced. Numerous fruitful investigations remain to be undertaken.

Future Invasions

Predictions of what species will invade, and where and when invasions will occur, remain one of the more elusive aspects of biological invasion science (Mooney and Drake 1986; Drake et al. 1989). Thousands of species of marine and estuarine mollusks that occur in Europe, Africa, South America, Asia, and Australia overlap in basic environmental requirements with habitats that occur in North America. Selecting probable invasion candidates from this vast fauna, and predicting competitive, predatory, or other interactions with previously established molluscan species or ecological equivalents as potential mediators of successful establishment, is a frustrating task. It is doubtful, for example, if an examination of the Asian biota would have identified the clam *Potamocorbula amurensis*, among a background of scores of other estuarine taxa, as a high profile potential invader.

Nevertheless certain limited projections may be made. The New Zealand fresh and brackish water snail *Potamopyrgus antipodarum*, established in western Europe, and occurring in densities of up to 800,000 snails per square meter, is a probable future invader of eastern North American fresh and oligohaline habitats (JTC, C. L. Secor, and E. L. Mills, in preparation). Abundant fouling bivalves in India and Asia, such as the mussels *Modiolus striatulus* and *Limnoperna fortunei* (Morton 1977), may yet reach North America. If large scale inoculations of the Pacific oyster *Crassostrea gigas* on the Atlantic coast commence in the 1990s (as opposed to the many smaller previous releases), successful establishment may take place (presumably the species will be raised on the Atlantic coast from larvae or clean seed, and the introduction of associated organisms with large stocks of adult oysters will not take place).

Also predictable are the eventual detection of natural sets of the Japanese sea scallop *Patinopecten yessoensis* in British Columbia, the spreading of the European edible oyster *Ostrea edulis* from Rhode Island south and west into Long Island Sound, the establishment of the periwinkle *Littorina littorea* in San Francisco Bay if not elsewhere on the Pacific coast, the establishment of the New Zealand green lipped mussel *Perna canaliculus* (Carlton 1992a: 16) in California (to where it is now imported daily in large numbers for direct human consumption) and the spreading of the Asian clam *Potamocorbula amurensis* from San Francisco Bay to other bays on the Pacific coast.

Broadly, the recent appearances of *Rangia cuneata* in the Hudson River, of *Perna perna* in Texas, of two species of the zebra mussel *Dreissena* in the Great Lakes and thus much of the rest of North America, and of *Potamocorbula amurensis* in San Francisco Bay, argue strongly that future, ballast-water mediated invasions will continue to be a regular phenomenon in North America. On any day, perhaps any hour, it is likely that the larvae of dozens of species of mollusks are released into coastal waters of North America by ballast water. Similarly, steadily increasing local, national, and global pressures to expand mariculture industries through the importation of new candidate species will almost certainly mean the accidental (or intentional) release of novel species.

These predictions arise from the projection that the basic mechanisms of human-mediated transport of non-native species outlined at the beginning of this paper will remain in place for many years to come. This forecast is despite the existence of a number of international guidelines (including those of the International Council for the Exploration of the Sea, Carlton, 1989) that exist to prevent the release of detrimental species through fisheries and mariculture activities, and despite growing international awareness of the role of ballast water in transporting exotic species transoceanically and interoceanically. While our inability to always distinguish between certain mechanisms of introduction of exotic species may make full control difficult, identifying and quantifying the role of such mechanisms, followed by cooperative management efforts, are the necessary precursors to eventually modifying the rate of "chess play" of new invasions.

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[This concludes the reprinting of the article"Introduced Marine and Estuarine Mollusks of North America: An End-of-the-Century Perspective by James T. Carlton. I hope that some of you at least have taken the time to read at least part of the series. Dorothy Raeihle and I would welcome articles such as those submitted by Allen Aigen, Al Scarpetti, Eli Horowitz, and Nick Katsaras as an alternative to reprinting so much of the contents of the NOTES. Any comments, suggestions and even criticism will be welcomed and considered. My supply of material for future issues is getting to be quite small, so material is welcome immediately - ws]

REMINDER - The September meeting of the New York Shell Club is scheduled for the fourth Sunday of the month, at 2 p.m., in the Blum Lecture Room, 1st floor, on the 77th Street side of the building. Enter through the 77th Street entrance, go into the Northwest Indian Hall and make a left before you get to the Naturemax Theater. Blum Lecture Room should be clearly marked. If in doubt, ask one of the security guards or the person on duty at the information desk.

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Dues for all members are due and payable for the following year beginning each September, as follows; full membership $9.00 per year, family membership $11,00 per year, corresponding membership $7.00 per year in the United States; overseas membership $9.00 per year paid in U.S. currency.

The Treasurer-Membership Chairman should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS - 1993 - 1994

PLEASE NOTE: There are differences in the date and place for the September and April meetings. The September meeting will be on Sunday, September 26 at 2 P.M. in the Blum Classroom at the Museum, and our April meeting will be on April 10, 1994, our annual Social/Auction. Consult the current edition of the NOTES for confirmation of date, day and time of each meeting.

September 26, 1993
October 10, 1993
November 14, 1993
December 12, 1993
January 9, 1994
February 13, 1994
March 13, 1994
April 10, 1994
May 8, 1994
June 12, 1994

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, except our Social/Auction (and the September meeting as noted above.)

On our meeting days, you may gain admission to the Museum without paying a fee by presenting your New York Shell Club membership card.

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September through June, in Room 319 of the American Museum of Natural History, New York City (unless otherwise advised). Present NYSC membership card for admission on meeting dates.

PROGRAM SCHEDULE

SUNDAY, December 12, 1993 at 2:00 p.m. - Christopher Boyko, Scientific Assistant, Department of Invertebrates, AMNH, will speak on hermit crabs and how they select the shells they inhabit.

SUNDAY, January 9, 1994 at 2:00 p.m. - Leonard Brown, Long Island Shell Club member, will show slides and speak on the topic "Diversity in the family Epitoniidae".

SUNDAY, February 13, 1994 at 2:00 p.m. - New York Shell Club member Carl Ehrlich will talk on "The World of Cedo-Nulli", showing a nice selection of this favorite Conus from his dive trips.

SUNDAY, March 13, 1994 at 2:00 p.m. - Rich Kelly of the Long Island Shell Club will make a repeat appearance with a program entitled "Shelling and Natural History in Newfoundland".

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We hope you enjoy the selection of articles included in this issue. Robert Robertson's piece on coiling in gastropod shells will be completed in the March 1994 issue - please let us know if you think this sort of article is worthwhile.

We would like to remind all members that we welcome articles, clippings, any sort of item on mollusks. While we may not be able to print everything that we receive, everything we receive is very much appreciated. We would like to hear from more people about how they became interested in shells, and we could do more on a topic such as "favorite shells", if we receive the material.

We have received notification that the Sarasota Shell Club is offering for sale a Cypraea collection that was donated to the club. Details will be available at the December NYSC meeting. You can purchase the entire collection or single shells.

Now is the time to begin thinking about the NYSC April social and auction. We will need shells and shell related items if we are to have a successful auction.

HIGHLIGHTS OF RECENT MEETINGS

SEPTEMBER 26: The meeting, which had been scheduled for the Blum Classroom, had to be changed to the Linder Theater, explained President Al Scarpetti, since the floor of the classroom was under water! Once everyone was situated, the normal business followed. The minutes of the June meeting were read and accepted. The treasurer's report for the year ending May 31, 1993, was read and accepted. Theta Lourbacos also reported on income and expenses for the annual auction, which netted over $1,000. Thanks to all who participated in this event.

Al reported that Betty Renman, now 90 and living in Oregon, has suffered a slight stroke. The club has sent a card, and Theta will write to the daughter with whom Betty is now living.

Al asked for a consensus on reviving the Shell-of-the-Month presentation. All were in favor, and Eli Horowitz volunteered to be the presenter in October. Eli also reported that the fossil pit in Sarasota, Florida has been closed, but that he had found some fossils washing ashore at Venice Beach, Florida.

The door prizes were a 1992 shell-photo calendar, won by David Epstein; a pair of Cypraea tigris, won by Irv Hoppenwasser; Cyrtopleura costata, won by Nick Katsaras; and a copy of "Florida Shells", by Aldrich & Snyder, won by Milton Werner.

The speaker was Nick Katsaras, who expanded on his reminiscences on dealers he has known or has bought shells from via the mails. "I never thought there were so many," he said, thinking back to the years when his list of contacts was small but growing. He recalled going back to Miami, where he had been stationed during the war, to see it as a civilian. There he heard about Mrs. Lillias Cockerell, and traveled to mosquito-ridden Sanibel Island to meet her and look over this shell mecca. Others whom he mentioned and commented on were Crosby McArthur; Simon DeMarco; Veronica Johns, who bought a Conus gloriamaris and donated it to the American Museum; Walter Webb, who exhibited coins and shells at the 1893 Chicago World's Fair; F. G. Lowerre, who specialized in volutes; Jim Moore; Selma Lawson; Archie Jones, who specialized in Liguus; Bob & Dottie Janowsky; Masao Motoi of Kyoto; Carlos Leobrera. Philippine dealer who held a drawing in which Nick won $1,500 worth of shells; Fernando Dayrit of the Philippines; Elsie Malone; Roger Dunn; Al & Beverly Deynzer; Luigi Raybaudi Massilia of Italy; Philip Hano and John Q. Burch.

Nick displayed photographs of some of these people, and fine specimens of Voluta bednalli, Marginella pringlei and Acteon virgatus.

OCTOBER 10: In the unavoidable absence of the president and vice-president, Ed Cowles chaired the 418th meeting of the New York Shell Club.

The Shell-of-the-Month presentation was by Eli Horowitz, who commented on and displayed specimens from two familiar genera of the Melongenidae - Melongena and Busycon. The shells he brought were Busycon carica, B. contrarium, B. canaliculatum, and B. spiratum. He also mentioned the rare B. coarctatum. His Melongena specimens were melongena, patula, pyrum, wardiana and a myristica from the Philippines. He noted that the only enemy of this carnivorous group in our waters is Pleuroploca gigantea, a member of the family Fasciolariidae.

The speaker was Jon Greenlaw, of the Long Island Shell Club, whose subject was "Diversity in Strombus." He described himself as a general collector who has a special interest in the family Strombidae, which includes the genera Strombus, Tibia, Terebellum, and Lambis. He mentioned the related families Aporrhaidae and Xenophoridae. Members of the Strombidae are active day and night, he noted, and the sexes are separate. Along with many slide photos of shells that demonstrated the wide variability in this family, he also showed a map listing the number of species to be found in various areas of the Pacific.

There was much comment about a most unusual circumstance of the meeting - the absence of Nick Katsaras. This meant that his perfect attendance record, which started at the club's second meeting, ended at 416!

Referring to the above statement about Nick Katsaras, we are happy to report that Nick is well and attended the November 14 meeting. He explained that the change in the September meeting to the 26th upset his schedule and he just "forgot about" the meeting on October 10. Nick, it's always good to see you.

1994 Winter and Spring Shell Shows and Other Events

Jan. 22-23
Astronaut Trail Shell Show, Melbourne, FL
Jim & Bobbi Cordy, 385 Needle Blvd.
Merritt Is., FL 32953 (407) 452-5736

Jan. 28-30
Greater Miami Shell Show, N. Miami, FL
Bob Pace, 7405 S.W. 128th Court
Miami, FL 33183 (305) 386-3442

Feb. 4-6
Broward Shell Show, Pompano Beach, FL
John Chessler, 7401 S.W. 7th St.
Plantation, FL 33317 (305) 791-5909

Feb. 10-12
Ft. Myers Festival of Shells, Ft. Myers, FL
Edie Chippeaux, 1308 Biltmore Drive
Ft. Myers, FL 33901 (813) 936-4058

Feb. 12-13
Centenary Shell Show, Adelaide, Australia
Wayne Rumball, Malacological Society of S.A.
c/o Invertebrate Section, S. Australian Museum
North Terrace Adelaide 5000, S.A.
Australia (8) 381-3987

Date to be decided
VIémes Recontres Internaionales du Coquillage,
Paris, France
Gilbert Jaux, 3 rue Saint-Honore 78000
Versailles, France (1) 39-53-80-46

Feb. 18-20
Naples Shell Show, Naples, FL
Gary Schmelz, 5575 12th Ave. S.W.
Naples, FL 33999 (813) 455-4984

Feb. 18-20
Sarasota Shell Show, Sarasota, FL
Peggy Williams, P.O. Box 575
Tallevast, FL 34270 (813) 355-2291

Feb. 25-27
St. Petersburg Shell Show, Treasure Is., FL
Bob & Betty Lipe, 440 75th Avenue
St. Petersburg Beach, FL 33706 (813) 360-0586

Mar. 3-6
Sanibel Shell Show, Sanibel, FL
Bidi Dean, 1801 Olde M. Gulf Dr., #C-D
Sanibel, FL 33957 (813) 472-9101

Mar. 10-12
Marco Is. Shell Club Show XI, Marco Is., FL
Dr. Bill Reid, 976 Sundrop Court
Marco Island, FL 33937 (813) 394-6245

Mar. 18-20
Treasure Coast Shell Show, Stuart, FL
Mrs. Edwin M. Fry,
1542 Jupiter Cove Dr., Apt 502
Jupiter, FL 33469 (407) 774-2502

Apr. 8-10
Georgia Shell Show, Atlanta, GA
Mrs. Louise Compton, 4236 Lower Roswell Rd.
Marietta, GA 30068 (404) 971-2431

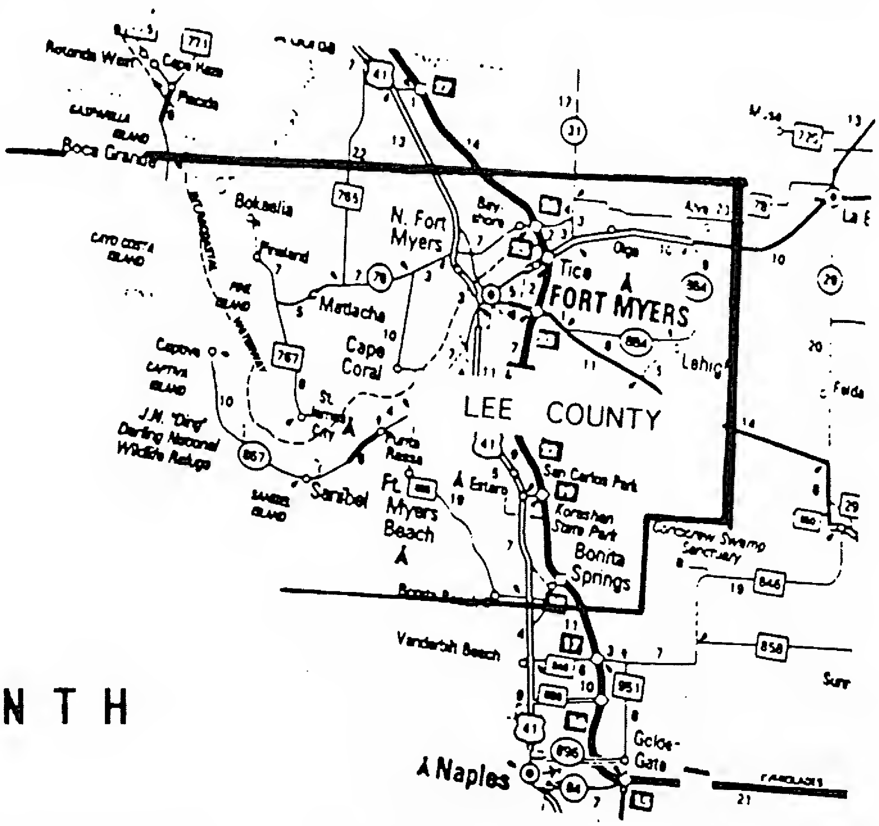
Apr. 22-24
St. Louis Shell Show, St. Louis, MO
Vern Stubblefield, 8028 Orlando
St. Louis, MO 63105 (314) 863-5207

May 7-8
Fourth Belgium International Shell Show,
Aarschot, Belgium
R. De Roover, Vorsterslaan 7
2180 Ekeren-Donk, Belgium (3) 644-3429

Jun. 18-19
XIIIéme Salon International du Coquillage,
Lutry, Switzerland
Dr. Ted W. Baer, CH-1602 La Croix
Switzerland (21) 393771 or 207371

List complied by Donald Dan, Awards Chairman of Conchologist of America, Inc.
2620 Lou Anne Court, W. Friendship, MD 21794, U.S.A. Tel. (410) 442-1242 or 442-1942

SHELL NEWS OF THE MONTH



Lee County has recently adopted a law which was originally promulgated by and for Sanibel Island in October 1987. It refers to a limit for the taking of live mollusks, so as to preserve and protect the limited resources of live shellfish and shell beds found within Lee County, Florida. The law states, in effect, that no person shall harvest, possess, take more than two live shellfish of any single species, per day, within Lee County. Included are any living mollusk (Phylum Mollusca) or echinoderm (Phylum Echinodermata), excluding oysters (*Crassostrea virginica*), hard clams (*Mercenaria spp.*), and venus clams (*Macrocallista nimbosa*), bay scallops (*Argopecten irradians*) and coquinas (Genus *Donax*). Harvest means catching or taking by any means whatsoever, followed by a reduction of such shellfish to possession. Temporary possession of a shell for the purpose of determining whether it contains a live shellfish shall not constitute harvest, so long as such shellfish is not harmed in any way. The Department of Natural Resources may issue permits to harvest or possess more than two live shellfish of any single species within Lee County for experimental, scientific or exhibitional purposes. It is lawful to harvest any shell within Lee County, so long as such shell does not contain any live shellfish at the time of harvest and so long as a live shellfish is not killed, mutilated or removed from its shell prior to such harvest.

(THE MOLLUSK, Greater Miami Shell Club 31(10), October 1993)

The above item and the first on page 5 should be of interest to every collector who enjoys traveling to Florida and collecting shells while vacationing. One has to wonder about the cost and effort of enforcing such limits - might it not be a simpler matter to educate the public on the need to conserve natural resources rather than "bring on the troops" to try and find out whether someone strolling the beach has collected living animals or just empty shells. One further point to remember - if you plan to collect shells in Florida, you must purchase the Florida fishing license. These are easily obtained at sporting goods shops and the appropriate department at stores such as Wal-Mart.

Sanibel Wants To Ban All Live Collecting!

A total live shelling ban for all of Sanibel's beaches is in the works. On 7 September, the Sanibel City Council unanimously passed a resolution asking the Florida Marine Fisheries Commission (MFC) to propose a special law prohibiting the collection of live shells from Sanibel's beaches.

In 1983, Sanibel asked the state to approve a similar law limiting the collection of live shells to two shells per person, per species, per day. This law took four years to get through the MFC and the governor's office. It was approved in 1987 and the law remains in effect today, setting the standard for other beach communities. The current law was extended to include all of Lee County during the first part of September.

Chairman of the city's wildlife committee and executive director of the Sanibel/Captiva Conservation Foundation, Erick Lindblad, initiated the movement to an all-out ban on shelling in July. At the July 6 council meeting, Lindblad noted that the present ordinance has been "difficult to enforce and, as a result, collecting in excess of these limits occurs regularly." He also noted that he heard no objections from guides, shell shop owners or other area businesses, but invited their comments at the public hearing.

No one spoke against the resolution at the council meeting and Lindblad and island shelling guide Alice Anders rose in strong support of it.

"Sanibel is already a sanctuary for wildlife. We would like for Sanibel to be a sanctuary for shells as well," Anders said.

The ban would include all shells except for oysters, clams and coquinas, which are often used to make soup, council members noted. Also included in the ban are sand dollars and starfish.

The resolution will be sent to the MFC and, if approved, to the governor's office for final approval. No time frame on a decision is known.

Abridged from Sanibel/Captiva Island Reporter, Sep 10, 1993

IN MEMORIAM

Dr. Richard S. (Joe) Houbrick, 56, curator of mollusks in the department of invertebrate zoology at the Smithsonian Institution's National Museum of Natural History, died of cardiac arrest on August 17 at Georgetown University Hospital. He had been battling leukemia for more than a year.

Born in Trenton, NJ, he studied in Florida and received his doctorate in marine invertebrate zoology from the University of South Florida. He moved to Washington, DC in 1971 and was a specialist in gastropods of the family Cerithiidae and related families and genera. His papers were meticulous in detail and thoroughly researched. He did extensive field work in the United States, the Caribbean and the South Pacific. He was fully involved in such professional activities as research and teaching and had served as president of the American Malacological Union.

We extend our sympathies to his family and colleagues. He will be missed.

We have received word of the passing of NYSC member John Ruddley of Rego Park, NY. John and his wife Stella, who survives him, were members of NYSC since 1964 and we are pleased that Mrs. Ruddley has continued her membership. Our condolences to Mrs. Ruddley and her family.

We also extend deepest sympathies to NYSC member and long-time editor Dorothy Raeihle on the passing of her brother who lived in Delaware.

We have been informed that NYSC member Annita Levine is now in a nursing home on the west coast and is unable to continue with the club. She and her late husband Morris had been members of NYSC since 1972. Our thoughts are with her family.

A SNEAK PREVIEW

Margaret Thorsen, Editor, THE JUNONIA

I had dinner last week with Sam and Gertrude Ford, who had just returned from their summer in Virginia. They remarked that they made a last-minute trip to the Smithsonian to see the mollusk exhibit. This, of course, channeled our conversation to a discussion of how fortunate we are that our own Bailey-Matthews Shell Museum is not an adjunct of a natural history museum where space must be shared among the multitude of natural history disciplines. Over the next several days, I kept recalling our conversation, and I became more and more convinced that the time was appropriate to give you all a sneak preview of what is in store for you in our museum.

You may well ask why I presume to write this. Since 1987, my computer and I have been responsible for recording all acquisitions: the shells, books, slides, related artwork, equipment, and furniture which have been given to us. A museum devoted exclusively to shells gained many well-wishers from the very inception of the idea, and cartons of their gifts began arriving. Several people changed their wills and directed that their collections and libraries come to us. Their gifts were the result of years of collection and study, and they were re-directed to us in the belief that they would find a more *visible* home in a "shell" museum such as ours than in the vaults of one of our huge, prestigious museums of natural history where exhibit space is shared. It has been my happy responsibility to deal with each gift as it is received. I have held in my hands shells that I knew only from pictures and shells whose value is such that I have seen them only in a museum or under glass in a counter equipped with an alarm system. We have received shells with color variations that I never knew existed and anomalies that defy explanation. I have opened boxes from local residents and tourists; from South Africa, Moscow, Oman, Puerto Rica, England, France, and Israel; from amateur as well as serious collectors; and from dealers, museums, and universities. We have received "treasures" from children and from dear little old ladies who walk the beach when the weather permits. Our acquisitions include marine, fresh-water, fossil, and land shells. I am often asked if we accept only specimen quality shells and if we sell or throw out shells. The answer to each of these is "No!" Since we are a museum whose avowed purpose is education, we welcome and have use for all of them except, of course, those which are broken and/or beach-worn beyond recognition. We do and will use them as follows:

1. Hands-On Children's Collection

A series of open cases which will contain (for local species) a growth series, color variations, egg case, a sliced shell so the inner structure can be seen, and a brief statement listing name, species, author, and habitat. It is intended that children handle these shells, if they wish, and use them as a means of identifying their own finds. We anticipate the need for numerous replacement shells; therefore we welcome a large number of shells from our local area.

2. Museum Exhibits

The "Great Hall of Shells" promises to hold an arresting group of exhibits. Some of these will be permanent (such as coverage of shells from our own area), and some will be constantly changing so as to provide the repeat visitor with an ever-changing view of shells from all corners of the globe: shells from varying habitats, shells of various families, shells which are typical of some characteristic or trait, shells with medical value, etc.

3. Exchange with other museums

We receive numerous requests from other museums for collections of shells endemic to this area. They send us, in exchange, a comparable collection or specimens of one or more species that we do not have. This practice enables us to secure many specimens which would otherwise be difficult or impossible to obtain for our exhibits.

4. School Collection Kits

Our very successful program of providing to public schools systems a kit containing 40 to 50 shells, labels, description, and identification materials is growing monthly and requires a great volume of shells. Many duplicates which are not needed for display or exchange are included in these kits. The Smithsonian sent us 23 cartons of their duplicates for this worthwhile project.

A major point to be made and emphasized is that the museum **will not sell shells!** Any shells you give to the Bailey-Matthews Shell Museum will be used in one of the ways noted above. The museum gift shop will not sell shells, nor will we at any time sell shells to dealers or to individuals.

I am personally very excited about the library. I wish I were 30 years younger and could really take full advantage of it. I think I do not exaggerate when I say that its coverage of mollusks, related sea life, and shellcraft materials is superior to that found in most libraries. Again, we have the advantage of being a specialized museum and need not concern ourselves with library materials in the other natural sciences. As of this writing, our reprint file encompasses eight 4-drawer filing cabinets, and I have many boxes that have yet to be processed. Our periodical coverage is fantastic. We have been given complete bound sets of such things as the Nautilus, Johnsonia, Veliger, La Conchiglia, Tulane Studies, Hawaiian Shell News, Of Sea and Shore, to name but a few. For children, we have nearly complete sets of Sea Frontiers and Cousteau's many publications. The serious collector will find the materials he or she needs, and the amateurs or complete newcomers to the world of shells will find a wealth of materials to spark their interest and keep them coming back for more! In addition, we have perhaps the only existing comprehensive file of newsletters of the major American shell clubs. Our book collection is a source of great pride and joy to us all. I wonder if I shall ever get them all entered on the computer and the cards printed for the card files. We chose to use the Library of Congress system of cataloging rather than Dewey Decimal. The book collection is extensive and includes many first editions and autographed copies. We are privileged to have many volumes with hand-written marginal notes by the previous owners - many of them historical giants in the field of malacology. This is the hardest job I have ever undertaken because it has put into my hands so many books that I have never seen and so much information that is fascinating. It takes a stronger will than mine to browse through for the information I need and then put the volume aside and go on to the next. One day my work output was 2 books - all the rest of the time I sat and read! Let me put it this way: there is a whole world of fascinating and valuable reading waiting for you on those shelves and in those files - regardless of your age and your background of knowledge about shells!!!

The audio/visual acquisitions are no less exciting. The slides and photographs we have been given are breathtaking, as is the equipment. Our most recent gift *(from the Sanibel-Captiva Shell Club!)* is a Kodak CD slide projection system. Each CD holds the images of 100 slides, or approximately 50 slides plus commentary if you choose to store pre-planned programs (i.e., slides plus narrative). The machine permits calling up onto a TV screen any of the stored images merely by pushing a button, and further allows us to "zero in" on a single shell (If the slide is one containing multiple shells) and enlarging it to full screen size. In terms of storage space and speed of accessing a particular slide, this system can't be beat. It is our intention that this Vision Bank (a library of slides and photos) be made available to all who need it. If, for example, I need a very special shell picture for the cover of the Junonia, or if a publisher, author, or student needs a picture of a particular shell, we will, for a reasonable fee based upon projected use, make a copy of the slide and send it. The Shell Club will doubtless use the CD equipment for special programs, as will the museum. The museum's meeting room, equipped with A/V equipment, will be vital to the many program offerings being planned by the museum staff.

I think we often regard a museum as merely a series of exhibits to walk through every few years and/or as one of the local attractions to which one takes one's house guests. A museum such as ours can and will be so much more than that! It will house a wealth of information on a subject dear to the hearts of our residents and visitors. It will be an invaluable resource to the science programs of our local schools - elementary through college. It will bring speakers, slide programs, and exhibits on a regularly scheduled basis. It will each year display winning exhibits in major shell show categories, both artistic and scientific. I can envision programs whose topics could range from the basics of shellcraft to how to cook clams to highly technical topics dealing with the latest fossil findings or new shell species. You need not be a fanatical sheller to appreciate the beauty and variety of shells, to be interested in how shells are constructed and how they eat, move, defend themselves, and reproduce, or to learn what shells have contributed to the world of medicine. Even non-shelling residents are concerned about proper maintenance of the habitat which supports these fascinating and beautiful creatures which have made Sanibel famous throughout the world. The museum will be the repository of the latest scientific information concerning the best "health plan" for mollusks and related sealife.

I never think of the museum without thinking of its close ties to our own shell club. So many of our members are already deeply involved with unpacking, sorting and storing shell collections, serving as hostesses at the Preview Center, alphabetizing and recording thousands and thousands of periodicals and reprints, covering books, and helping the Fords assemble and pack School Collection Kits. I feel good all over when I see Vivienne and Georgette stop sorting and get deep in excited conversation over some article they've found, when I hear Jakie exclaim "Oh little children will love this book!", or hear Melba remark "Well, I never knew that!" These are long-time shellers, yet each time they come to help with the library materials, they become totally absorbed in the content of the materials they're working with and ask when they can come again to help. If we were set up to do it, I could already be running an active lending library.

What a wonderful circuit we can now make: through Ding Darling to see the birds and to get a close-up view of our magnificent island habitat, to CROW to see how we care for our injured birds and animals, to SCCF to learn how we protect our land and marine environment, and to the Bailey-Matthews Shell Museum to see examples of living and fossil mollusks: from the sea, from fresh water, and from the land - and from Sanibel to the ends of the earth.

It has been a long time coming, but so well worth waiting for.

(We thank Dr. R. Tucker Abbott for sending us this exciting item on the new museum)

A SHELL WITH A NEW TWIST by Daphne Gail Fautin

(reprinted from NATURAL HISTORY, April 1992)

In 1989, I arrived in Hawaii with hopes of observing two animals on the deep-sea floor, a golden-shelled hermit crab and the extraordinary hermit crab that rides on its back. I had seen this symbiotic pair languishing in aquariums, but now I had the opportunity to see them in their natural setting - a quarter mile below the ocean waves. I steamed southeast of Oahu on a ship operated by the Hawaii Undersea Research Laboratory, and when we reached a point above an undersea ledge, the ship's crew lowered the small submersible "Makali'i" into the water.

When we reached 1,200 feet, the maximum safe depth for the craft, the pilot leveled off, and we cruised along a ledge of congealed lava. We were just inside the uppermost range of the deep-sea hermit crabs, animals that have been found at depths of half a mile. The darkness was pierced by brief bursts of light - colorful flashes emanating from sea fans and luminous jellyfish. Where the craft's floodlights illuminated a small patch of the rocky bottom, I scrutinized everything that came into view. After following the terrain for an hour, we finally spotted one of the spindly-legged hermit crabs, its golden shell concealed beneath an orangish pink anemone. It was ambling across the bottom, probably in search of its next meal. I couldn't learn much from that brief glimpse of the lone crab, but to me it was more exciting than the whitetip shark we saw circling the submersible two hours later as we waited for the mother ship to pluck us from the violent waves.

Ten years earlier, Hawaiian fishermen who had recently begun setting traps for deep water prawns inadvertently captured hundreds of the anemone-toting crabs and then brought them to the attention of Ann Fielding, a marine biologist at the Bishop Museum in Honolulu. She, in turn, contacted me at the California Academy of Sciences in San Francisco, where I was a curator in the Department of Invertebrate Zoology. Because of my special interest in anemones, she thought I might be able to identify this species attached to the thin golden shells of the deep-sea crabs. Unable to give her an answer without seeing them, I asked if she could send me some specimens. They turned out to be among the most extraordinary examples of co-evolution I had ever seen. But before explaining why, I should say something about the symbiotic relationship between anemones and hermit crabs.

Several dozen species of hermit crabs carry sea anemones on their shells, and marine biologists had assumed that the crabs use the anemones for protection. Donald M. Ross, a professor of zoology at the University of Alberta, tested the idea some twenty years ago. At the aquarium of the Stazione Zoologica, in Naples, he placed an octopus in a tank with shallow-water Mediterranean hermit crabs lacking anemones. The octopus easily pulled the crabs from their shells, devouring all six within a week. When he introduced an octopus to six crabs with anemones, however, none were harmed. In a typical encounter, the octopus reached out toward a crab with one arm, then extended another, then a third, but upon contact, the octopus abruptly withdrew its arms and tucked the other five under its body as it scuttled away in pain.

The anemone atop the crab had stung the octopus so badly that it would probably never touch another hermit crab. Like their cousins the jellyfish, sea anemones have tentacles that are stuuded with thousands of microscopic stinging capsules, or nematocysts, which fire hollow, harpoonlike threads that may inject toxin into an attacker's flesh.

Another series of experiments performed by Ross and Sigurd von Boletsky showed that, in the laboratory at least, hermit crabs carry anemones only when they are needed. Kept in predator-free tanks for months, crabs lightened their load by abandoning their anemones. If the researchers introduced an octopus into the tank, however, hermit crabs without anemones would attempt to steal them from crabs that had them, and crabs with only a few anemones on their backs would try to acquire more. In this game of "musical chairs," crabs unlucky enough to end up without at least one sea anemone were eaten, while the others were not. Ross and von Boletsky found that merely running water from a tank containing an octopus into one with hermit crabs caused the crabs to begin snatching anemones from one another. The chemical cues that warn of predators are usually present in the wild, so crabs in nature maintain this protective behavior.

Anemones deter other predators as well. Along the Atlantic and Gulf coasts of the United States, a species of box crab preys on hermit crabs using a claw that is specially adapted for snipping open snail shells. Richard Mariscal and Richard McLean, of Florida State University in Tallahassee, found that these predatory crabs killed about 80 percent of the hermit crabs that lacked anemones but less than 10 percent of those bearing anemones.

The anemones also benefit from the relationship. Most sea anemones seek a more or less permanent attachment on rocky areasof the sea floor where currents bring them the food they need. A hermit crab's shell provides the needed foothold and frees an anemone from its stationary existence. Mobility, in and of itself, is of no great benefit, but the crab takes its anemone to all the right places; crabs are excellent scavengers, sensing food at great distances and scurrying to it before other scavengers, such as sea urchins, isopods, or shrimp, can devour it. The anemone gets a free ride to the food, and as the crab tears away at its meal, the anemone feasts on scraps that drift about in the water.

This symbiotic relationship has drawbacks for both animals, however. If there were no need for protection, the crabs would be better off without the burden of their "machine gunners," as Randy Brooks, a zoologist at Florida Atlantic University, has called the anemones. He found that in assition to slowing the crabs down, carrying anemones is a balancing act. Brooks offered anemones of various sizes to hermit crabs with naked shells, and rather than placing them haphazardly on their backs, the crabs arranged them so that large anemones counterbalanced smaller ones.

The anemones run the risk of being abandoned by their partners when the crabs upgrade their homes. Because the hermit crab occupies a discarded snail shell, it must seek larger and larger shells as it matures. (If none are available, the crab stops growing.) Crabs of some species leave the anemones on the old shell, which may be found and occupied by another hermit crab moving up in the world. Other species of crabs have evolved nehaviors that insure that the partners stay together. If I try to remove an anemone from a shell, I usually tear the anemone because of its firm attachment. But a crab that has just moved to a new shell gently rubs the anemone on the abandoned shell, and presto - the anemone releases its hold, and the crab transfers it to the new shell, where it attaches firmly. More remarkably, some anemones initiate the move. With its base still attached to the old shell, the anemone bends over so that its tentacles adhere to the new one. It then releases its base, somersaults, and attaches to the new shell.

When I examined the anemones adorning the deep-sea hermit crabs from Hawaii, I realized they were very different from anemones that ride shallow-water crabs, and that they had achieved an elegant solution to the problems arising from the crabs' need for ever larger shells.

In the deepsea species, only one anemone is found with each crab, its base wrapped entirely around the shell. And rather than perching on top with its mouth pointed upward, its body is slung beneath the shell so that its mouth opens behind that of its hermit partner (the better to sare its meal). Most hermit crab anemones are robust, but these are very delicate. The laboratory specimens that I examined had been shrunk by the preservative, causing their bases to pull back and reveal a glistening gold shell that was so thin it felt like parchment and could be dented like a Ping-Pong ball. When I removed the shell from the fluid preservative, its shiny gold dried to a chalky white. I came to the startling conclusion that the anemone had fabricated the hermit crab's "snail" shell.

I had never heard of such a thing. Nor had my good friend and mentor Cadet Hand, a professor emeritus at the University of California at Berkeley and an expert on sea anemones and their symbionts. But after searching through a number of scientific volumes, I found that my "discovery" had been made twice before. In 1903, the famous American malacologist William Healey Dall had described a new species of snail from deep waters near Hawaii. He named it Stylobates aeneus - the brassy walker on stilts. Dall did not actually see the snail; his description was based on it shell, which was occupied by a hermit crab and topped by a sea anemone, both of which he discarded as uninteresting to a malacologist. Several years later, he published a short note revealing rather sheepishly his conclusion that the shell was made by the sea anemone on it, and therefore the name Stylobates aeneus rightly belonged to the anemone. Published in a journal of malacology, this startling emendation escaped notice by students of anemones.

In 1928, the most prolific sea anemone taxonomist of all time, Oskar Carlgren, then of Lund University in Sweden, published a 144-page list of the sea anemones collected by the German Deep-Sea Expedition, one of several expeditions launched about the turn of the century to explore the ocean depths by trawling and sampling the bottom. (These efforts, which emulated the British "Challenger" expedition of the mid-1870s, created the foundations for many of the world's best marine zoology collections.) Buried amid accounts of thirty-one new species was the description of Isadamsia cancrisocia, an anemone that makes a shell in which a hermit crab lives (hence the species name meaning "associated with a crab"). To Carlgren, an anemone that made a shell that looked precisely like one made by a snail was apparently unremarkable - sea anemones, after all, live at all depths and latitudes, form symbioses with algae and fish, not to mention crabs, and are, all in all, extraordinary beasts.

After examining the original anemones Carlgren had studied, and hundreds more from Hawaii and Guam, I concluded that they belong to two species in one genus. Stylobates aeneus is found throughout the mid-Pacific, and Carlgren's species, now properly termed Stylobates cancrisocia, is known only from the German Deep-Sea Expedition specimens, between Pemba Island (Near Zanzibar) and the coast of East Africa. Since rediscovering these creatures, I have described a third species of shell-making anemones from the coastal waters of Western Australia and am studying specimens of other new species from the Coral Sea and the Gulf of Mexico. Although some of these "snail" shells produced by these anemones are far from prefect replicas, they are all made of the same brassy, parchmentlike material. Each anemone is oriented somewhat differently on its shell, and each associates with a different hermit crab species.

With the help of Martin Lieberman, a chemist in San Francisco, I determined that the organic material of the shell is largely chitin, the substance of which crab shells and insect cuticles are made. Stylobates is not the only anemone capable of producing chitin. In one genus, an anemone uses chitinous material to construct a spongy float, from which it dangles, bobbing on the waves. An anemone of one shallow-water European species can add small amounts of the material to a hermit crab snail shell, enlarging it so that the crab does not have to change homes frequently. Only Stylobates, however, can build entire shells. The anemone begins the process by attaching itself to a hollow object (usually a shell from a small snail or other mollusk) into which a tiny hermit crab has inserted its abdomen. The anemone coats the object with the chitinous material and then extends the coating as the crab grows. Because the hermit crab's body is curved to fit into coiled snail shells, the anemone's secretions - guided by the corkscrew shape of the hermit crab's abdomen - produce a replica of a snail shell, no matter what the shape of the object originally inhabited by the hermit crab. The anemone produces the structure while perched on the crab, whereas the snail constructs it from within.

Snail Handedness

ROBERT ROBERTSON

The Coiling Directions of Gastropods

Potentially and actually, snails coil 4 (not 2) main ways, regardless of world hemispheres and ecological factors. Dextrality (right-handedness) is commonest, and sinistrality (left-handedness) can be a very rare abnormality. Ambidextrality (the common co-occurrence of both forms), though, exists in a few land-snail species. The terms dextral and sinistral are best defined with regard to the asymmetric anatomy of a gastropod, not its right-handedly or left-handedly coiled shell, if it has one. (Even a shell-less land slug can be sinistral.) A left-handed shell can contain an anatomically dextral animal, and the coiling direction of a larva can differ from that of the adult growing from it.

SNAIL SHELLS, COMPRISED OF MINUTE calcium carbonate crystals in a protein matrix, are attached to the body and grow by accretion at the shell lip into a right- or left-handed coil. There are also some right- and left-handed chemical molecules, and even DNA and RNA show handedness. In a bilaterally symmetrical animal (one whose right side is a mirror image of its left) a structural change in handedness is difficult to detect. Asymmetrically coiled gastropods are unusual whole organisms in clearly showing variations in handedness: The differences between right- and left-landed snail shells are fairly obvious, while the underlying biochemical cause of snail-body reversals is still unknown.

Coiling

In various ways, gastropods coil their shells (helices) and twist their bodies (a process called torsion). The different coiling types occur in different groups of snails. Why? Does the pattern of taxonomic occurrence reveal anything? Does it make any difference to snails whether they are dextral or sinistral? Are there similar phenomena in other animals?

DEXTRALS AND SINISTRALS

Most snail shells are right-handed (dextral), but some are left-handed (sinistral). Viewed apically, dextral shells coil clockwise, and sinistral ones counterclockwise. Viewed with the spire up and the aperture facing forward, the aperture is on the right (dextral) (Figures 2, 14 right, 15 left, 17 right, 18 left) or the left (sinistral) (Figures 4, 14 left, 15 right, 16, 17 left, 18 right). If the operculum (structure closing the aperture) is spiral, viewed externally its whorls coil counterclockwise if the snail is dextral (Figure 3), and clockwise if it is sinistral. True (anatomical) sinistrality entails a mirror-image reversal of not only the shell and operculum but of the asymmetrical animal inside.

With dextrality, the primitively paired organs associated with the (originally posterior) mantle cavity (eg, gills, auricles of the heart, and kidneys) are reduced or absent (except in some primitive archaeogastropods) on the post-torsional right side, and the anus is displaced to the right. With sinistrality these paired organs are reduced or absent on the left side, and the anus is displaced to the left.[64]

Dextrality or sinistrality is manifested in the early embryo. Beginning in the late 2-celled embryo, well before torsion, the spiral cleavage of *Physa*

NATIONAL GEOGRAPHIC RESEARCH & EXPLORATION 9(1):104–119; 1993

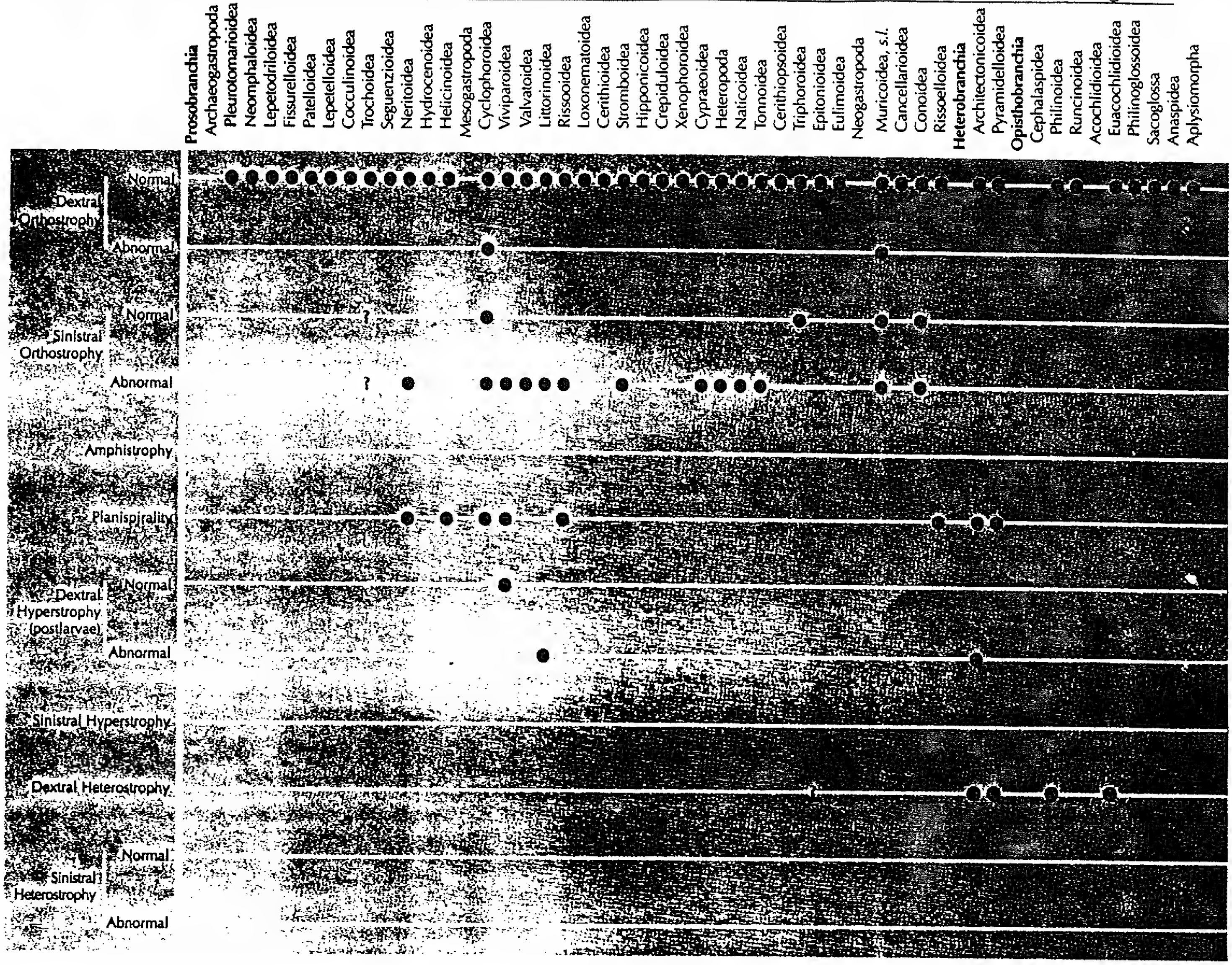


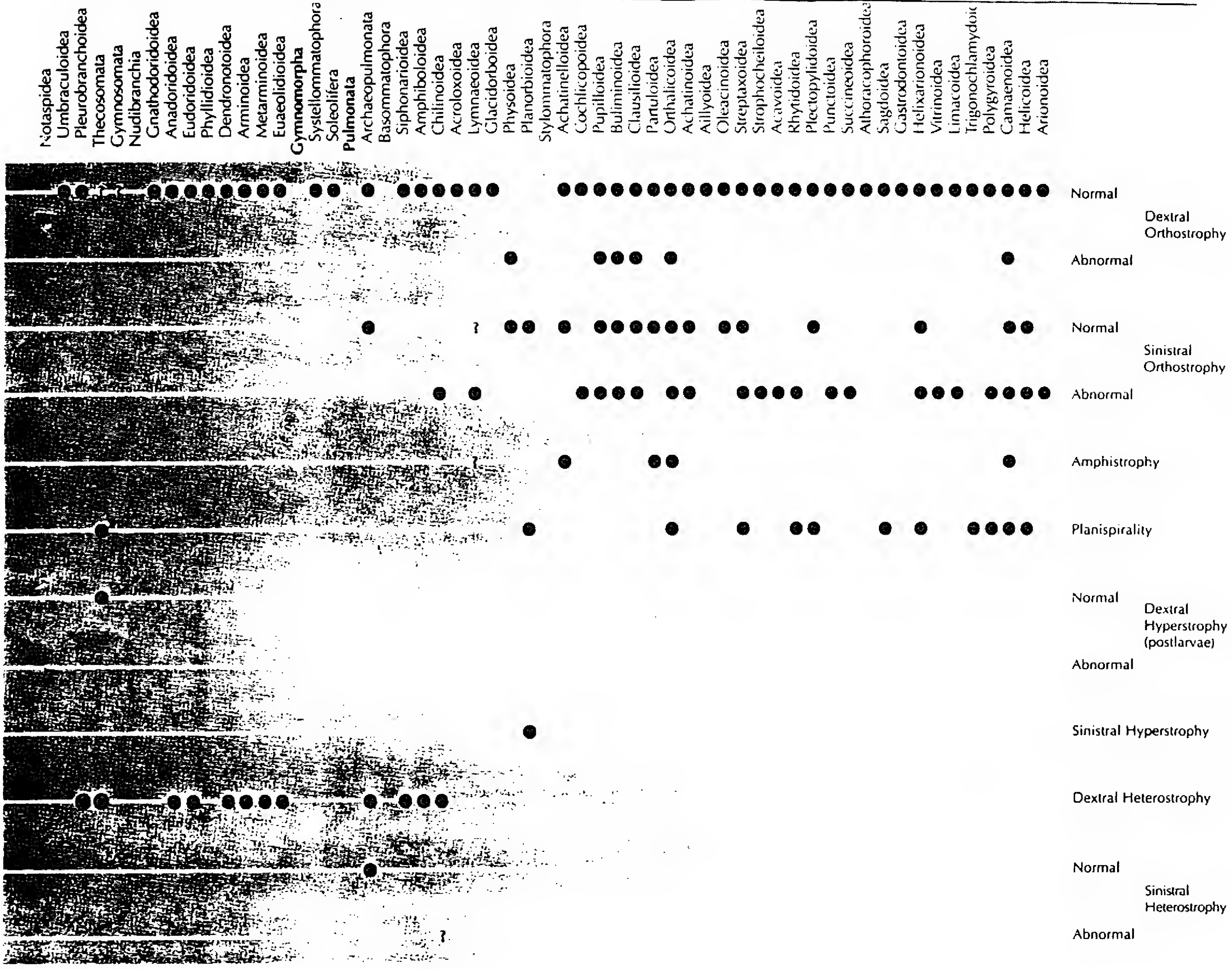
Table 1.
Systematic list of the suprafamilial taxa of all living gastropods, showing taxonomic occurrences of 12 coiling categories in 95 superfamilies (following KC Vaught[73]). The data are from P Pelseneer,[54] W Wenz,[76] A Zilch,[77] R Robertson,[63] B Parkinson et al,[50] RT Abbott,[1] and other sources. Spots mean that 1 or more specimens are known in a coiling category. Blanks mean negative occurrences or unknowns.

ROBERT ROBERTSON, curator (honorary), Department of Malacology, The Academy of Natural Sciences, Philadelphia, PA 19103-1195.

(normally sinistral) (Figure 6B) is reversed relative to that of (normally dextral) *Lymnaea* (Figure 6A).[10] In abnormally sinistral *Lymnaea* it is also reversed, as in normal *Physa* (GA Ubbels[in 58]). These reversals start well before shell growth starts. If a snail starts life embryologically dextral it remains so throughout life; the same is true of sinistrals.

Torsion

Coiling and torsion are different phenomena, best thought about separately, yet they interact. Torsion ("twisting") must be considered in this context because, primitively at least, this brings about a 180° rotation of the gastropod head–foot relative to the viscera. (Some argue that there is "detorsion" in higher gastropods.) Torsion is brought about in a snail's early larval stage (ie, well after the 2-celled stage) by muscles inside the already-growing shell.[11,12] A reversal from dextrality must also reverse the direction of torsion.[36]



Genetics

The inheritance of sinistrality and dextrality has been little studied.[44] There are data for only a few freshwater and land pulmonate species.[6,14,45,46,48] In them, coiling is controlled by a pair of alleles. For *Lymnaea* and *Helix*, sinistrality is recessive. For *Laciniaria* and *Partula*, dextrality is recessive.

In several instances abnormally sinistral pulmonate land snails (eg, *Helix*) have given birth to all normal dextral progeny. To understand the genetics of gastropods we must carry this experiment at least 1 generation further to allow for "maternal inheritance" (or, delayed segregation).[68]

All pulmonates are simultaneously hermaphroditic, and many (such as *Helix*) can self-fertilize. If a dextral *Helix* is heterozygous and self-fertilizes, the resulting Mendelian ratio is 2 heterozygous to 1 homozygous for dextrality and 1 homozygous for sinistrality. Regardless of these genotypes, all the young will have the same coiling (phenotype) as the "mother." As a result, if "she" is

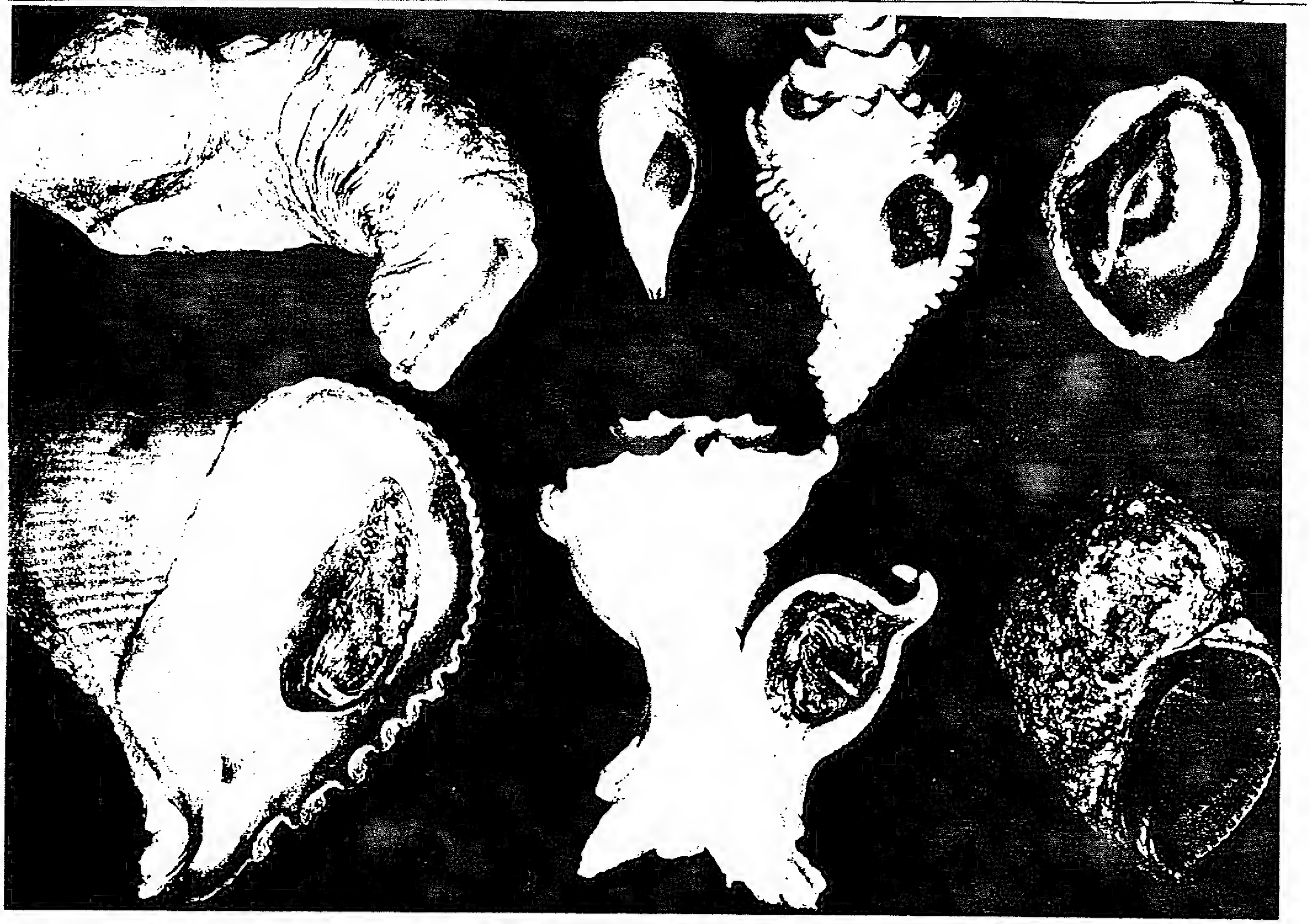


Figure 2.
Shells of representative genera in the snail (gastropod) family Coralliophilidae dwellers with coelenterates, showing shell diversity. As in most families of gastropods, only dextral, orthostrophic animals are known. Magilus antiquus, top left, uncoils but presumably is dextral anatomically. All marine, mainly tropics
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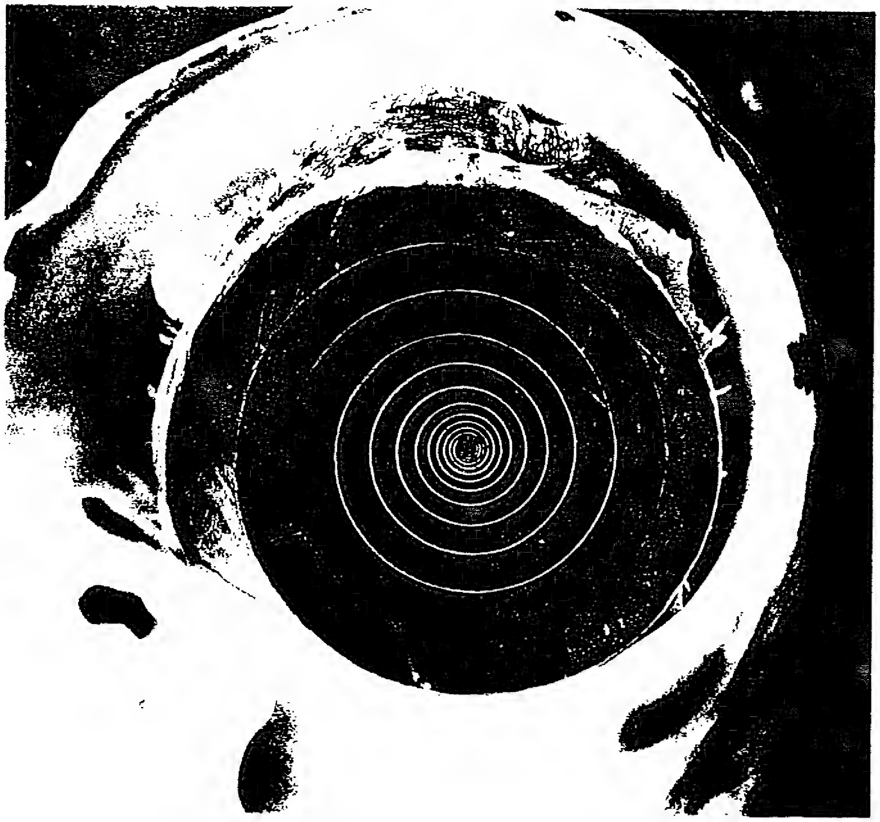

Figure 3.
The West Indian "whelk" Cittarium pica. Multispiral, dextral operculum in aperture of living animal. Marine, Bahamas.
ROBERT ROBERTSON

dextral, even the young homozygous for sinistrality will have the dextral phenotype. The genotype will not be expressed until the following generation.

Orthostrophy and Hyperstrophy

Some right-handed animals occupy left-handed shells and are misleadingly called sinistral.[33,51,52,75] Consider a snail's shell spiraling down the axis around which it revolves, the condition termed orthostrophy (usual coiling). But the shell does not always spiral down. Going around the axis in the same direction, the whorls can also spiral up the axis. This is hyperstrophy (unusual coiling). The original base of the shell (the animal's left side) becomes a new "spire" and the original spire becomes a "base" (Figure 5). Think of a spiral coil (helix) pulled through itself. It is as if the apex of a widely umbilicate or planispiral shell (one with flat coiling intermediate between orthostrophy and hyperstrophy; Figures 8&9) were pushed through, turning the shell upside-down. The animal inside undergoes some readjustments, but nothing as drastic as total anatomical reversal. For example, the rectum and anus come to lie near the opposite end of the (reversed) aperture (compare Figures 7B&D). Planispirality can be a prelude to hyperstrophy. There is no intermediacy between dextrality and sinistrality. Orthostrophy and hyperstrophy apply implicitly only to shelled animals. J Brookes Knight[33] best described and illustrated dextrality, sinistrality, orthostrophy, and hyperstrophy, naming the 3rd term.

Scalariformity is orthostrophy or hyperstrophy carried to an extreme; the shell spirals down or up the axis more than normally for the species, so that successive whorls are almost or completely detached from one another. CS Richards believed scalariformity in *Biomphalaria* to be a sub-

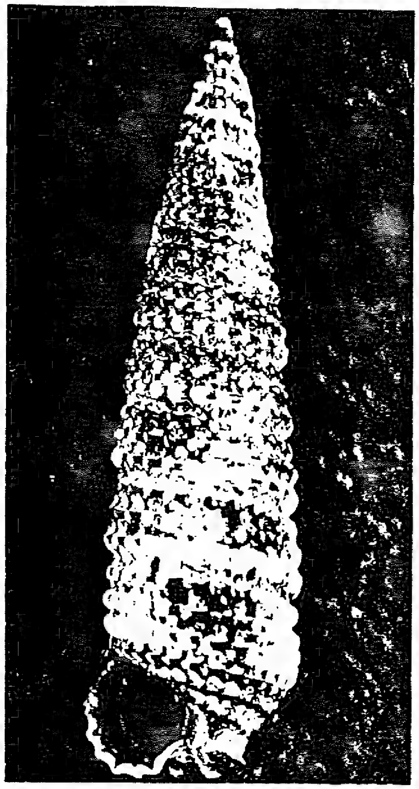

Figure 4.
Triphora *sp. Normally sinistral, orthostrophic. Marine, tropics.*
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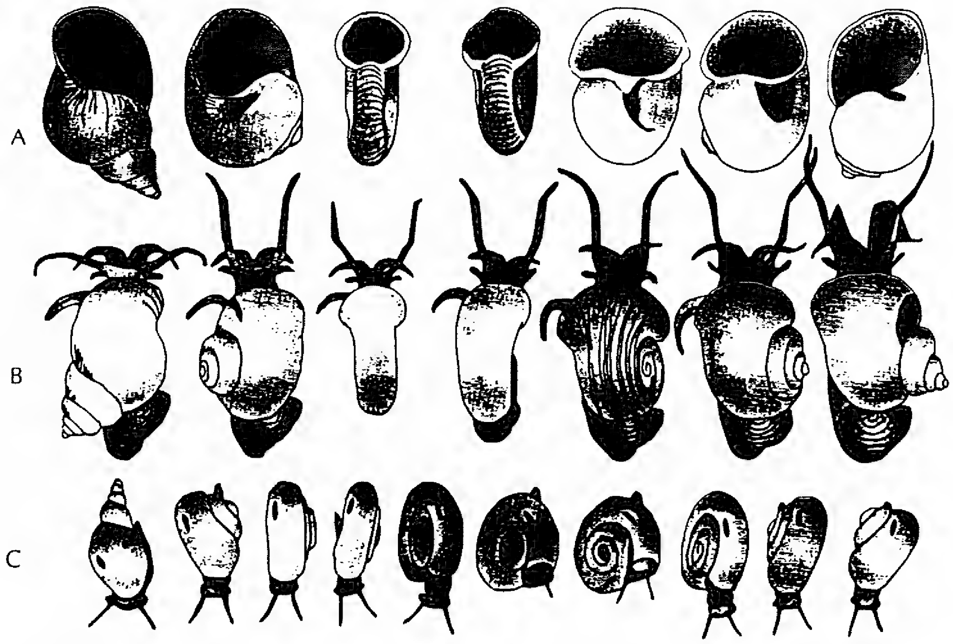

Figure 5.
Transitions from orthostrophy to hyperstrophy (right to left in all 3). A and B show it in shells and animals of the dextral Ampullariidae (from K Hescheler[24]). C shows it in a generalized sinistral basommatophoran (from JW Taylor[69]). The heart is shown black. All freshwater.

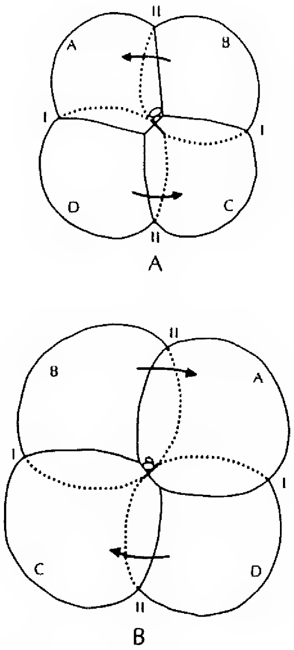

Figure 6.
Four-celled embryos of A, Lymnaea *(dextral) and B,* Physa *(sinistral), showing different directions of cleavage (from E Crampton Jr[10]).*

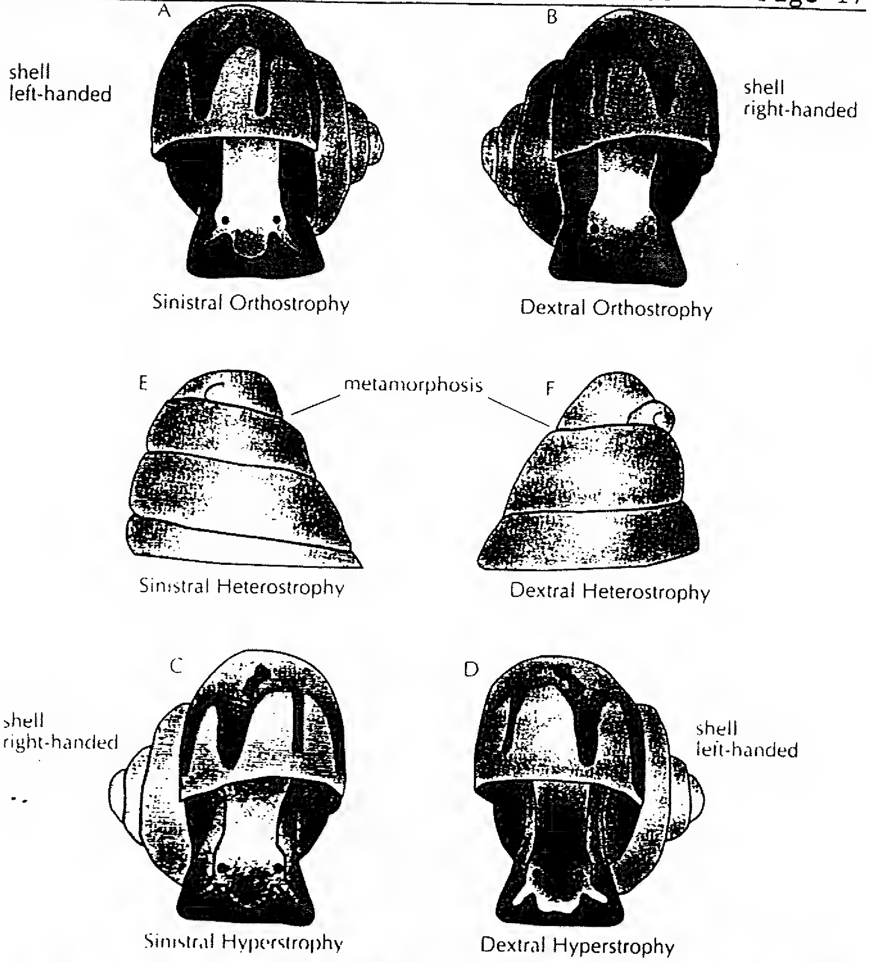

Figure 7.
The 4 main kinds of gastropod coiling (A–D), with the rectum and anus, and the heart (with its single auricle) and single ctenidium (with some lamellae) indicated (modified from JB Knight,[33] *after Naef). Potentially and actually there are living snails that are: A, sinistral and orthostrophic; B, dextral and orthostrophic; C, sinistral and hyperstrophic; and D, dextral and hyperstrophic. Heterostrophic shells (E&F) start by coiling hyperstrophically and at metamorphosis change to orthostrophy. E* (Blauneria) *is original here; F is a pyramidellid* (Odostomia) *apex (modified from G Thorson*[71]*).*

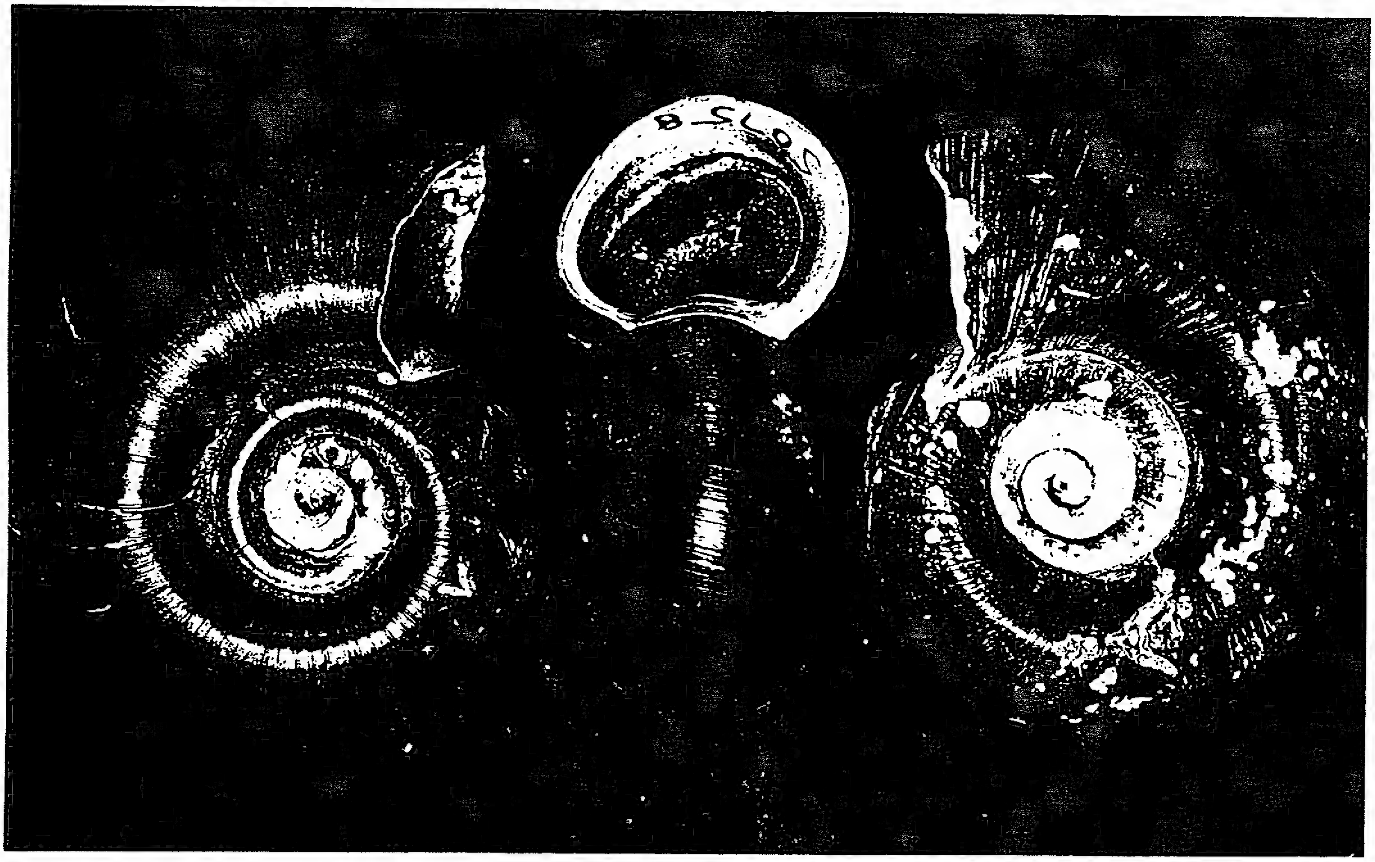

Figure 8.
The ramshorn snail Marisa cornuarietis. *Dextral and planispiral. Freshwater, Suriname.*
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All the figures follow the convention of having dextrals with the aperture on the right, sinistrals with it on the left, orthostophics with the spire up, and hyperstrophics with it down (except Figures 1&8).

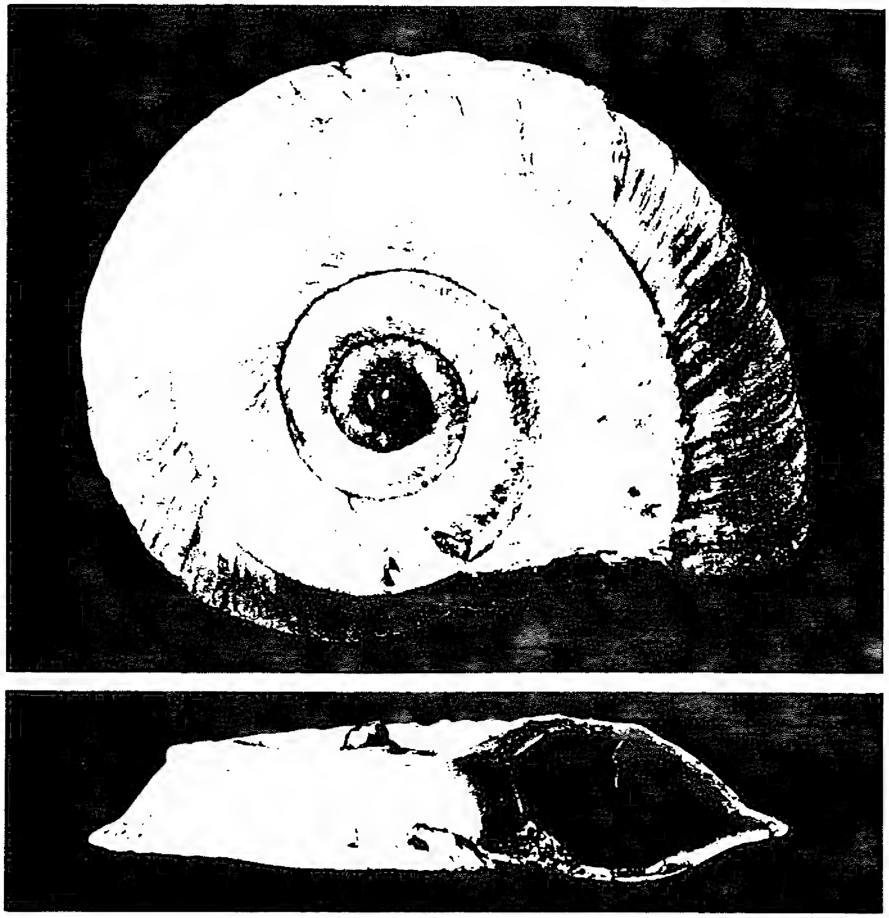

Figure 9. (top & middle)
Bostryx (Discobostryx) planissimus. *Near planispiral. Land, Peru.*
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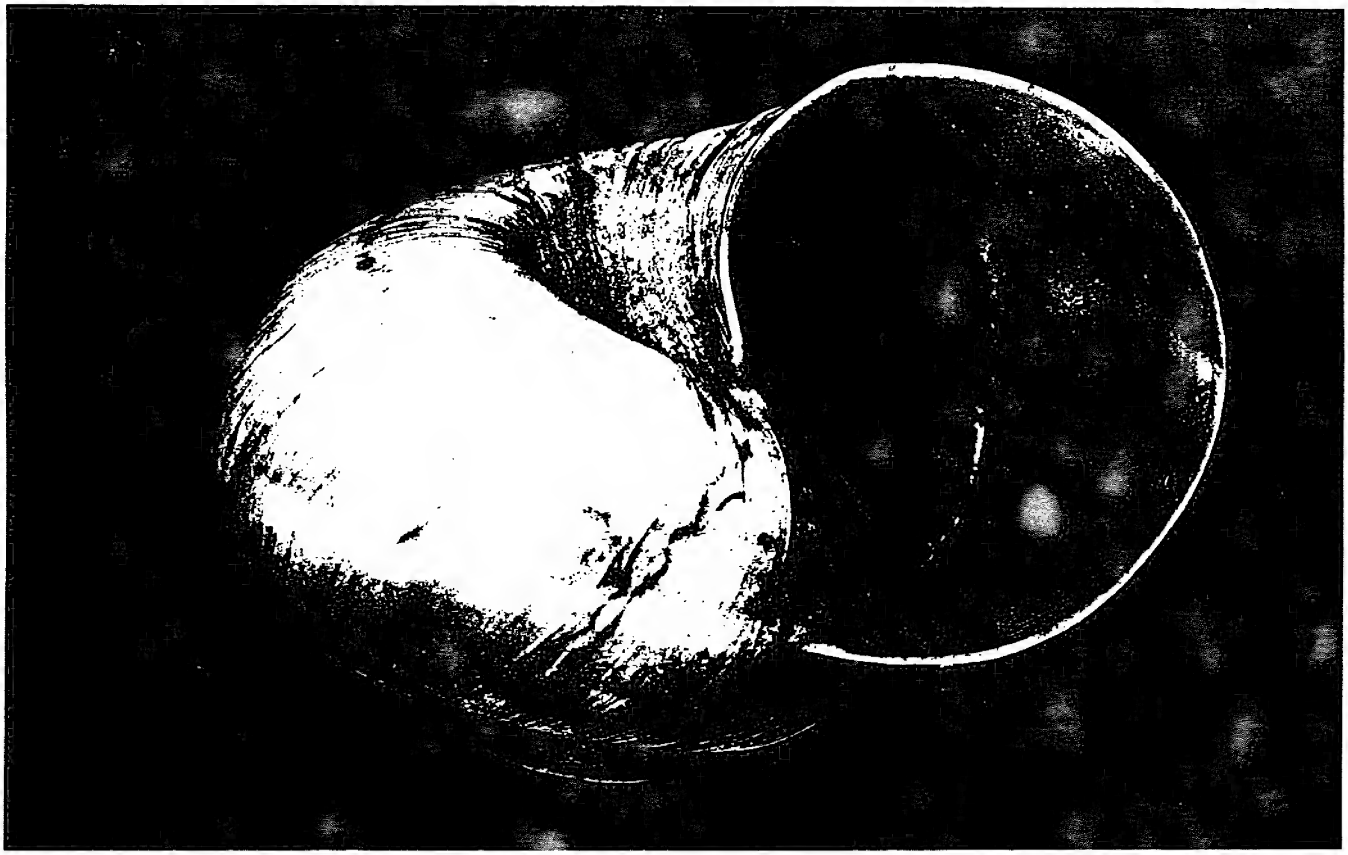

Figure 10. (below)
Lanistes boltenianus. *Dextral and hyperstrophic. Species in this genus are the largest living gastropods that are hyperstrophic. Freshwater, Nile region, Africa.*
ROBERT ROBERTSON

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The Treasurer-Membership Chairman should be notified promptly of any change of address.

NEW YORK
SHELL CLUB
INC.

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SCHEDULE OF MEETINGS - 1993 - 1994

PLEASE NOTE: There are differences in the date and place for the September and April meetings. The September meeting will be on Sunday, September 26 at 2 P.M. in the Blum Classroom at the Museum, and our April meeting will be on April 10, 1994, our annual Social/Auction. Consult the current edition of the NOTES for confirmation of date, day and time of each meeting.

September 26, 1993
October 10, 1993
November 14, 1993
December 12, 1993
January 9, 1994
February 13, 1994
March 13, 1994
April 10, 1994
May 8, 1994
June 12, 1994

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, except our Social/Auction (and the September meeting as noted above.)

On our meeting days, you may gain admission to the Museum without paying a fee by presenting your New York Shell Club membership card.

NEW YORK SHELL CLUB NOTES No. 330 March 1994

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September through June, in Room 319 of the American Museum of Natural History, New York City (unless otherwise advised). Present NYSC membership card for admission on meeting dates.

PROGRAM SCHEDULE

SUNDAY, March 13, 1994 at 2:00 p.m. - Rich Kelly of the Long Island Shell Club will make an encore appearance with a slide program called "Shelling and Natural History in Newfoundland".

SUNDAY, April 10, 1994: Annual Auction and Social - Viewing of Auction Items from 11 AM to 1 PM; Auction will begin at 1 PM. See page 3, this issue for details; list and directions will be mailed.

SUNDAY, May 8, 1994 at 2:00 p.m. - Waldemar Hansen, world traveler and lecturer will share with us his slides of tropical flora and fauna. Plan to attend; see page 10, this issue for details.

SUNDAY, June 13, 1994 at 2:00 p.m. - Mel & Sylvia Springer, world travelers in their own right, will share with us a slide program called "Touring in Thailand" - another program you shouldn't miss.

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We all are sorry that snow forced cancellation of our February meeting - we were looking forward to Carl Ehrlich's presentation on *Conus cedonulli*. We trust this program will be rescheduled for a future meeting. We have been offered a special treat for our September meeting - Gertrude Moller of the Jacksonville Shell Club will be in this area and would show slides of her trip last Fall to the Solomon Islands. This should be well worth scheduling and we thank Gertrude for offering.

Your editor (typist, compiler, error-maker, etc.) is very grateful for all your help in sending articles and information that can be used in our NOTES. These pages should be a joint effort, and you are helping to make this so. We should note that the article "A Shell With a New Twist", printed in our December NOTES, was reprinted in a recent issue of the Sanibel-Captiva Shell Club's THE JUNONIA.

HIGHLIGHTS OF RECENT MEETINGS

NOVEMBER 14: President Al Scarpetti noted that donations of auction material for April are needed. There is nothing on hand at present. Al said that a note from Betty Renman's daughter reported that Betty had made strong recovery from her stroke, and is again at home. Al will present the Shell-of-the-Month in December.

Romuald Czepulkowski had on display some freak specimens of Bufonaria rana and six species of bulimulid land snails.

The door prizes were Conus vexillum, won by Rich Kelly; Amoria molleri, won by Al; and Strombus gallus, won by Harvey Frajlich.

Al drew attention to some pages from two magazines, sent by Fred Cannon. One set depicted shell designs on ceramic pieces, and the other set the shell shrine of Sir Alfred Jodrell, of Norfolk, England. Fred included a note inviting members to visit his home. Al said he would call Fred and arrange a date for the visit.

The speaker was Rich Kelly, of the Long Island Shell Club, whose subject was the family Columbellidae. He noted that most of the 38 genera and 700-plus species are found in tropical waters, with a particular concentration in the Panamic province. Different species favor different depths, in a range from shallow water to more than 200 meters. Species in the genus Columbella are herbivorous, and others are omnivorous or carnivorous. With slide photos showing pairs of shells, Rich pointed out resemblances between various species in the family and species in other families. He also showed photos representing his collection, covering 24 genera. These colorful, variable shells are so small, he noted with satisfaction, that they need little cleaning.

DECEMBER 12: President Al Scarpetti reported that a collection of Cypraea had been been donated to the Sarasota Shell Club and is now available for purchase.

Al brought up the subject of the May meeting, at which the speaker will be Waldemar Hansen. A large turnout of NYSC members and guests may be expected - if we would move the meeting to the Linder Theater on the first floor, the cost would be $125 instead of the usual $40. Al will ask if the museum would publicize a meeting open to the general public and also ask Mr. Hansen if he knows of associates of his who would plan to attend our May meeting. With these questions answered, it will then be decided by vote whether we will rent Linder Theater for the May meeting.

The shell of the month, presented by Al Scarpetti, was Conus pertusus Hwass, 1792. The colors of this striking Indo-Pacific species cone shell are red, pink, and orange, which unfortunately are subject to fading as specimens age. A form with cords in its texture is called festiva.

The speaker was Christopher Boyko, Scientific Assistant, Department of Invertebrates, AMNH. His subject was hermit crabs, which he said could not survive without shells and were the only animals which need shells more than shell collectors. Hermit crabs occupy two of four allied superfamilies, one including land species and the other marine species. Mole crabs make up the third superfamily, and a deep-sea crab the fourth. A hermit crab, like other crabs, has ten appendages, but two serve only to anchor the crab in the shell. Hermit crabs can switch from dextral to sinistral for their first few molts but then become set as one or the other. Of the 600 species, the marine ones are found almost everywhere, and the terrestrials are mostly tropical.

No one, Chris said, has evidence that hermit crabs will kill and eat a snail in order to acquire its shell, but these crabs are known to fight each other for a shell and even to pull off evictions. When a suitable shell isn't available, they will use coconut shells, broken light bulbs, etc.

Of the six species that inhabit Guam, the five largest favor shells of Achatina fulica, an African land snail introduced for food by the Japanese during World War II. A. fulica proved to be so destructive that eventually a flatworm was introduced to eat the snails. This tactic proved so successful that now hermit crabs are seen wearing Achatina shells in much used, rather battered condition.

Chris had on display nine specimens of various species in alcohol.

Dr. & Mrs. Charles Hesselbach, NYSC members who became corresponding members when they moved to the Cayman Islands in 1981, were present. Mrs. Hesselbach reported that she had seen hermit crabs, which she raises, escape from buckets by forming "ladders of crabs". This behavior seemed to her to be deliberate.

JANUARY 9: Looking forward to the May meeting, at which explorer Waldemar Hansen will be the speaker, President Al Scarpetti said that he would make a poster for display outside the Museum's Linder Theater, where the meeting will be held.

Al reported that the Long Island Shell Club has proposed another joint field trip to the New York Aquarium, date to be decided. He also noted that Fred Cannon will be in touch with him to set a date in the Spring for the Club's visit to Fred's home. Al added that he would soon be sending letters to shell dealers, requesting donations for the April auction.

Visitors Hillary Rettig and Charles Whitman were introduced. The door prizes were Oliva porphyria, won by Romuald Czepulkowski; Scaphella junonia, won by Hillary Rettig; a copy of "Mollusks," won by Harvey Frajlich, and a copy of "Guide to Shells," by A.P.H. Oliver, won by Milton Werner. Saving the best for last, Al announced that this was Nick Katsaras's birthday. [Congratulations to Nick on the occasion of his 85th - we should all look so good when we reach this age - ed].

The speaker was Leonard Brown, of the Long Island Shell Club, who presented a survey of the family Epitoniidae, in which he specializes. His comments, accompanied by slide photos of shells from his collection, mentioned especially the genera Amaea, Cirsotrema, Opalia, Acirsa, Sthenorytis, Eglisia and Epitonium. He conjectured that the ribs so prominent in the family may be a defense against drilling by predators. He has seen only one specimen of epitonid shell with a drill hole, and it was of a species without ribs. His comments on the photographs pointed out the variations in ribs, coiling and other features.

COMING ATTRACTIONS, Part 1: April Auction and Social

The New York Shell Club Annual Social and Auction will be held on Sunday, April 10 at Dorothy Jensen's Broadway Dance Studio, 31-08 Broadway, Astoria, Queens. We welcome all donations of specimen shells, shell books, and shell-related items. To date we have received donations from Romuald Czepulkowski, Nick Katsaras, Walter Sage, Sol Weiss, Victor Wee, Dan Spelling, Mique's Molluscs, and Bob and Dottie Janowsky. These donations are most appreciated, but further material is needed to make this a succesful fund raiser for NYSC. Funds realized at the auction are needed to cover the cost of routine operations and the printing of our quarterly NYSC NOTES. We also need volunteers to provide refreshments and to help before and during the auction. Arrangements will be discussed at the March 13 meeting. A list of the available items will be prepared and mailed to local members. For further information, call Sol Weiss, Auction Chairman, at 516-221-4924.

Congratulations are in order as Editor Emerita and long-time NYSC member Dorothy Raeihle celebrates her 85th birthday on May 9. At last report she is getting along well and ready, as we all are, for Spring. Those wishing to share her celebration are invited to send cards to 211 Milligan Road, West Babylon, NY 11704-8210. A phone call to 516-669-3478 would be most welcome.

SHELLING THE PHILIPPINES

by Mel Springer

As an amateur conchologist, I have long wanted to explore the Philippines. They consist of more than 7100 islands (of which only 730 are inhabited), and are home to many of the world's tropical seashells.

With no knowledge of the area other than recognizing names familiar from World War II - Bataan, Corregidor, Leyte, etc. - it was time to look for expert help. Our friendly travel agent put us in touch with Southeast Asia Tours, located in Manila. We explained what we were looking for, gave the time period available to us, and awaited the plans they would arrange for us. A few days later we had received a complete itinerary, composed of a land package and all air connections.

At noon on the 22nd of November, 1993, off we went, destination Manila, the capital of the Philippines. Our plans called for a direct flight from JFK to Tokyo, and after a slight detour to Fairbanks, Alaska for refueling and a connecting flight from Tokyo to Manila, we arrived in Manila on the 23rd of November, 11 pm.

We were met at the airport by our assigned English-speaking guide, Manny. Under his escort we arrived at the five star Hyatt Regency Hotel, which became our home base in the Philippines. The Hyatt was an excellent hotel, with all the amenities one could want, plus the fact that it was beautifully decorated for Christmas.

Our first day in Manila was a free day to relax and catch our breath from jet lag. The following morning we checked with the doorman to see if there was a shopping area nearby. He replied that there wasn't, so we decided to take a walk along Manila Bay. We walked only a short distance from the hotel and came upon block after block of open-air markets, where almost anything you could name was being sold at open street stalls. There were knock-out Polos being sold for 65 pesos (under $3.00 US), and even a fresh fish market. Needless to say, we found several of the local seashells for sale. We purchased a few of each species, which were all weighed in a single plastic bag, sold by the kilo and priced as one unit. The cost was 20 pesos (about 75 cents) for about 20 shells (clean them yourself).

Back at the hotel we made plans for the afternoon, and the consensus of opinion was to call the travel agent in Manila and arrange for a city tour. After lunch, Flora, our English-speaking guide, arrived with a driver and an air-conditioned car, and off we went to see the city of Manila. Our guide turned out to be a former teacher, and aside from being a fountain of information about the city, was a lovely person. We visited the American cemetery where servicemen from all the United States Armed Forces killed in the Philippines in World War II are buried. There were fields of crosses in neat rows for as far as the eye could see. This was a very somber moment, as our memories of World War II, even though we were youngsters at the time, were brought to the forefront.

After visiting the cemetery, we drove around downtown Manila and were impressed with the high-rise office buildings, museums, arts center and many housing complexes that we saw. We then stopped at an ancient prison, where during World War II Amereican and Filipino prisoners were killed by the Japanese. We learned that, at low tide, the Japanese would pack prisoners into cells bordering the river - the prisoners drowned when the tide rose and the cells were completely under water. A large cross commemorated this area.

During our time in the automobile we spoke of our hobby of seashell collecting and mentioned that I corresponded with the owner of Carfel Shell Shop and Museum. We were then taken by Flora to meet Carlos Leobrera, the owner and one of the authors of "Shells of the Philippines". It was nice to finally meet someone you had corresponded with but had never met in person.

On the way back to the Hyatt Regency, Flora asked the driver to detour to her home, where she presented us with a beautiful shell doll, made by a craftsman from the island from which her father came. It is a work of art.

The next day we were up early and off to the Domestic Airport for our Philippine Airlines flight to the "Flying Dog Resort" on Dalupiri Island located off the northwest coast of Samar. Our plane landed in the city of Catarman. We then boarded a "Jeepney", which is an old US army jeep with a new body built on top and used as a bus. An hour and a half later, with sore bottoms, we were put into a native outrigger canoe and sailed for 20 minutes to our island destination.

The cabins at the resort were quite rustic. There was no fan or air-conditioning, just a large net over the bed to keep out the mosquitos. The electricity sometimes worked. More important, however, our food was good and fresh and all meals were prepared just as we had requested in advance. There were plenty of local fruits and vegetables. The service was great, as we were the only guests at the island resort. But why talk about the accomodations? The beaches were ankle deep in shells and the water was crystal clear for viewing the underwater life. For three days we beach collected, snorkeled, and enjoyed the beauty of the flora and fauna, as there were many native animals to be seen and photographed. We found numerous cones, cowries, murex, cassis and olive shells. We made friends with the staff of the resort as well as the local fishermen and children. All gave us shells to add to those we had collected. When departure time arrived, our many new friends came down to the beach to say goodbye - it was very heartwarming. At the airport for the return to Manila, we were nine pounds overweight, due to our shell collecting. When we deplaned in Manila, Manny was waiting - it was like meeting an old friend.

Back to the Hyatt for a night's rest. We checked one suitcase into security at the hotel, as we did not want to lug all these shells with us on the next leg of our journey. We then flew to the city of Dipolog, located on the northwest coast of the island of Mindanao. Wewent from the airport by jeepney over some fairly rough roads to the "Dakak Beach Resort". This resort is an exotic hide-away overlooking scenic Dapitan Bay, and is located in a National Park. The accomodations were luxurious - color TV, refrigerator, air-conditioning and many other amenities. The white sand beaches and exotic jungle trails offered the guests numerous activities to keep busy those who did not lounge by the two pools. There was tennis, horseback riding, sailing, windsurfing, and an unbelievable sight in the jungle, a four-lane bowling alley! A three-hole golf course was under construction. Meals were delicious, with many varieties of local dishes available. At dinner a local band and dancing group entertained.

We beachcombed and snorkeled every day and soon found ourselves laden with shells. It was then that we met David and Margaret, an English couple who turned out to be shell collectors. David told us that there was a sheller's "dream bay" on the other side of the mountain, approachable by a jungle trail.

Bright and early the next morning, up and over the mountain we went. As we neared the beach on the other side, it was o bvious that the tide was out. The sea life was abundant, the colors breathtaking, the variety of shells overwhelming, and all this in no more than two feet of crystal clear water. WE noticed many locals on the reef at low tide, hunting for food and realized that a small fishing village was just off the beach. We visited with the villagers, who spoke little English, but were very happy to have us there. We felt like explorers of old.

After four days of pure pleasure and making more friends, we were off to our next stop, Zamboanga City, situated on the southwestern tip of Mindanao. Also called "City of Flowers", Zamboanga City is famous for its barter market. Here goods from Indonesia, Malaysia, Singapore and Taiwan formerly entered the Philippines and were traded for Philippine goods. This tradition has given way to strictly "cash and carry". We toured the busy city, once again with an English-speaking guide, this time in a hired jeepney. The guide took us to several shell shops, but we did not want to buy shells, but to self-collect.

Taking the advice of our guide, we booked an all-day tour to Santa Crus Island. The next morning we were joined by an Australian woman and a Swiss gentleman for a 20-minute motorized outrigger canoe ride to the island. The four of us became well-acquainted as we were the only non-locals there. The beach collecting was good and the snorkeling excellent. There were many coral reefs and varities of fish to see. We were served a sumptuous barbecue, consisting of homemade sausage, giant prawns, local crabs, fried eggplant and a large lapu-lapu (a local milkfish) with rice, salad, and local fruits. Each of us was allowed one soft drink, so we had "Fantas". All this food was prepared by a pair of cooks who had accompanied us to the island. The Muslim islanders offered us shells and hand-made jewelry (from shells, what else). WE purchased several items as a token of appreciation for being allowed on their island. Some of the locals realized I was knowledgeable about sea life and brought different shells and coral to me for identification and to learn the English names. The trip back to the hotel, which was called "Lantaka by the Sea", proved to be an adventure. The tide had turned and the smooth ride to the island had become a ride for life, as we rode waves many times higher than the boat. Thankfully, the local boatsman knew his business and no incident occurred.

On the day of departure from Zamboanga City we decided to try our hand at bartering with the local boat people, who offered shells for sale along the seawall outside the hotel. The items we did not want to take back to the United States (T-shirts, beach shoes, cookies, sunglasses, and peanut butter) were readily traded for more seashells. It turned out to be fun for all concerned.

That afternoon we were back at the airport for our return to Manila and the Hyatt Regency, our "home away from home". Manny again greeted us - we were beginning to feel that he was like a son. Our trip to the islands of the Philippines was now over. Overall, we found that the accomodations and food were great. But above all we had everywhere found the Filipino people very warm and friendly.

For all those who are considering the Philippines a place to vacation, explore, and collect shells, we say go, go, go - but take us with you.

Land Snails of the Land of Israel/Natural History and Field Guide by Joseph Heller. published (in Hebrew) by the Ministry of Defence, Israel. available through Steinmetsky Bookstores, Tel Aviv. 48 sheckels (about $16.00).

Lying between Africa, Europe and Asia, and varying from deserts below sea level to a snow-peaked mountain, Israel has a very wide variety of land and freshwater snails, many of which make handsome specimen shells. Having spent over a year in Israel, I have a fair collection of them, which I had assumed would remain inadequately identified until I retired and spent weeks in the museum library. Luckily, the increasing number of amateur and professional naturalists in Israel has led to the publication of a popular book on the land and freshwater snails, written for amateurs and researchers alike.

Written in Hebrew, it describes and illustrates virtually all the land snails to be found in Israel, with less comprehensive coverage of freshwater snails. The line drawings and color photos are excellent, and are accompanied by clear location maps. Latin names and sizes in millimeters are provided, and make the book easier to use for beginners while worthwhile for more advanced and knowledgeable students. Most of the book is dedicated to all aspects of the life of the snails, reflecting much modern research on ecology and physiology.

At such an expensive price for a good, hardcover book, it is well worth the cost. Of course, you may have to travel to Israel to get a copy, but that's worth the cost too! All land shell afficionados will want to own this book.

A SNEAK PREVIEW

Margaret Thorsen (The JUNONIA, October 1993)

I had dinner last week with Sam and Gertrude Ford, who had just returned from their summer in Virginia. They remarked that they made a last-minute trip to the Smithsonian to see the mollusk exhibit. This, of course, channeled our conversation to a discussion of how fortunate we are that our own Bailey-Matthews Shell Museum is not an adjunct of a natural history museum where space must be shared among the multitude of natural history disciplines. Over the next several days, I kept recalling our conversation, and I became more and more convinced that the time was appropriate to give you all a sneak preview of what is in store for you in our museum.

You may well ask why I presume to write this. Since 1987, my computer and I have been responsible for recording all acquisitions: the shells, books, slides, related artwork, equipment, and furniture which have been given to us. A museum devoted exclusively to shells gained many well-wishers from the very inception of the idea, and cartons of their gifts began arriving. Several people changed their wills and directed that their collections and libraries come to us. Their gifts were the result of years of collection and study, and they were re-directed to us in the belief that they would find a more *visible* home in a "shell" museum such as ours than in the vaults of one of our huge, prestigious museums of natural history where exhibit space is shared. It has been my happy responsibility to deal with each gift as it is received. I have held in my hands shells that I knew only from pictures and shells whose value is such that I have seen them only in a museum or under glass in a counter equipped with an alarm system. We have received shells with color variations that I never knew existed and anomalies that defy explanation. I have opened boxes from local residents and tourists; from South Africa, Moscow, Oman, Puerto Rica, England, France, and Israel; from amateur as well as serious collectors; and from dealers, museums, and universities. We have received "treasures" from children and from dear little old ladies who walk the beach when the weather permits. Our acquisitions include marine, fresh-water, fossil, and land shells. I am often asked if we accept only specimen quality shells and if we sell or throw out shells. The answer to each of these is "No!" Since we are a museum whose avowed purpose is education, we welcome and have use for all of them except, of course, those which are broken and/or beach-worn beyond recognition. We do and will use them as follows:

1. Hands-On Children's Collection

A series of open cases which will contain (for local species) a growth series, color variations, egg case, a sliced shell so the inner structure can be seen, and a brief statement listing name, species, author, and habitat. It is intended that children handle these shells, if they wish, and use them as a means of identifying their own finds. We anticipate the need for numerous replacement shells; therefore we welcome a large number of shells from our local area.

2. Museum Exhibits

The "Great Hall of Shells" promises to hold an arresting group of exhibits. Some of these will be permanent (such as coverage of shells from our own area), and some will be constantly changing so as to provide the repeat visitor with an ever-changing view of shells from all corners of the globe: shells from varying habitats, shells of various families, shells which are typical of some characteristic or trait, shells with medical value, etc.

3. Exchange with other museums

We receive numerous requests from other museums for collections of shells endemic to this area. They send us, in exchange, a comparable collection or specimens of one or more species that we do not have. This practice enables us to secure many specimens which would otherwise be difficult or impossible to obtain for our exhibits.

4. School Collection Kits

Our very successful program of providing to public schools systems a kit containing 40 to 50 shells, labels, description, and identification materials is growing monthly and requires a great volume of shells. Many duplicates which are not needed for display or exchange are included in these kits. The Smithsonian sent us 23 cartons of their duplicates for this worthwhile project.

A major point to be made and emphasized is that the museum **will not sell shells!** Any shells you give to the Bailey-Matthews Shell Museum will be used in one of the ways noted above. The museum gift shop will not sell shells, nor will we at any time sell shells to dealers or to individuals.

I am personally very excited about the library. I wish I were 30 years younger and could really take full advantage of it. I think I do not exaggerate when I say that its coverage of mollusks, related sea life, and shellcraft materials is superior to that found in most libraries. Again, we have the advantage of being a specialized museum and need not concern ourselves with library materials in the other natural sciences. As of this writing, our reprint file encompasses eight 4-drawer filing cabinets, and I have many boxes that have yet to be processed. Our periodical coverage is fantastic. We have been given complete bound sets of such things as the Nautilus, Johnsonia, Veliger, La Conchiglia, Tulane Studies, Hawaiian Shell News, Of Sea and Shore, to name but a few. For children, we have nearly complete sets of Sea Frontiers and Cousteau's many publications. The serious collector will find the materials he or she needs, and the amateurs or complete newcomers to the world of shells will find a wealth of materials to spark their interest and keep them coming back for more! In addition, we have perhaps the only existing comprehensive file of newsletters of the major American shell clubs. Our book collection is a source of great pride and joy to us all. I wonder if I shall ever get them all entered on the computer and the cards printed for the card files. We chose to use the Library of Congress system of cataloging rather than Dewey Decimal. The book collection is extensive and includes many first editions and autographed copies. We are privileged to have many volumes with hand-written marginal notes by the previous owners - many of them historical giants in the field of malacology. This is the hardest job I have ever undertaken because it has put into my hands so many books that I have never seen and so much information that is fascinating. It takes a stronger will than mine to browse through for the information I need and then put the volume aside and go on to the next. One day my work output was 2 books - all the rest of the time I sat and read! Let me put it this way: there is a whole world of fascinating and valuable reading waiting for you on those shelves and in those files - regardless of your age and your background of knowledge about shells!!!

The audio/visual acquisitions are no less exciting. The slides and photographs we have been given are breathtaking, as is the equipment. Our most recent gift *(from the Sanibel-Captiva Shell Club!)* is a Kodak CD slide projection system. Each CD holds the images of 100 slides, or approximately 50 slides plus commentary if you choose to store pre-planned programs (i.e., slides plus narrative). The machine permits calling up onto a TV screen any of the stored images merely by pushing a button, and further allows us to "zero in" on a single shell (If the slide is one containing multiple shells) and enlarging it to full screen size. In terms of storage space and speed of accessing a particular slide, this system can't be beat. It is our intention that this Vision Bank (a library of slides and photos) be made available to all who need it. If, for example, I need a very special shell picture for the cover of the Junonia, or if a publisher, author, or student needs a picture of a particular shell, we will, for a reasonable fee based upon projected use, make a copy of the slide and send it. The Shell Club will doubtless use the CD equipment for special programs, as will the museum. The museum's meeting room, equipped with A/V equipment, will be vital to the many program offerings being planned by the museum staff.

I think we often regard a museum as merely a series of exhibits to walk through every few years and/or as one of the local attractions to which one takes one's house guests. A museum such as ours can and will be so much more than that! It will house a wealth of information on a subject dear to the hearts of our residents and visitors. It will be an invaluable resource to the science programs of our local schools - elementary through college. It will bring speakers, slide programs, and exhibits on a regularly scheduled basis. It will each year display winning exhibits in major shell show categories, both artistic and scientific. I can envision programs whose topics could range from the basics of shellcraft to how to cook clams to highly technical topics dealing with the latest fossil findings or new shell species. You need not be a fanatical sheller to appreciate the beauty and variety of shells, to be interested in how shells are constructed and how they eat, move, defend themselves, and reproduce, or to learn what shells have contributed to the world of medicine. Even non-shelling residents are concerned about proper maintenance of the habitat which supports these fascinating and beautiful creatures which have made Sanibel famous throughout the world. The museum will be the repository of the latest scientific information concerning the best "health plan" for mollusks and related sealife.

I never think of the museum without thinking of its close ties to our own shell club. So many of our members are already deeply involved with unpacking, sorting and storing shell collections, serving as hostesses at the Preview Center, alphabetizing and recording thousands and thousands of periodicals and reprints, covering books, and helping the Fords assemble and pack School Collection Kits. I feel good all over when I see Vivienne and Georgette stop sorting and get deep in excited conversation over some article they've found, when I hear Jakie exclaim "Oh little children will love this book!", or hear Melba remark "Well, I never knew that!" These are long-time shellers, yet each time they come to help with the library materials, they become totally absorbed in the content of the materials they're working with and ask when they can come again to help. If we were set up to do it, I could already be running an active lending library.

What a wonderful circuit we can now make: through Ding Darling to see the birds and to get a close-up view of our magnificent island habitat, to CROW to see how we care for our injured birds and animals, to SCCF to learn how we protect our land and marine environment, and to the Bailey-Matthews Shell Museum to see examples of living and fossil mollusks: from the sea, from fresh water, and from the land - and from Sanibel to the ends of the earth.

It has been a long time coming, but so well worth waiting for.

COMING ATTRACTIONS, Part 2: Waldemar Hansen, May 8th NYSC Meeting

"THE SEARCH FOR PARADISE"

Disillusion with the problems and ever-increasing stress of urban Western civilization long ago gave rise to "the search for paradise." From as early as the 18th century onward, the popular imagination became entralled with real or fictional accounts of shipwrecked lovers, castaways, and Western renegades abandoning hearth and home for faraway destinations. Novels such as Paul and Virginia, Robinson Crusoe, and Swiss Family Robinson became classics. Paul Gauguin found his way to Tahiti, as did Pierre Loti. Nordhoff and Hall took up the story of Fletcher Christian and his fellow mutineers of the Bounty; and James Michener offered avid post-Worl War Two readers his Tales of the South Pacific. Many movies extolled Oceanic edens and their tropical perfection: Bird of Paradise; Last of the Pagans; Goona Goona; Mutiny on the Bounty; Hurricane; The Blue Lagoon; and South Pacific.

How much is truth and how much is myth in all this preoccupation with islands where natural innocence and beauty are still supposed to prevail? From his vast personal collection of color slides taken during more than three decades of global peripatetics, author and global port lecturer Waldemar Hansen (presently "dean of the ocean waves" aboard Queen Elizabeth 2's annual world cruise) offers a stunning. all-visu al hour in search of paradise. Nature and man - flora, fauna, marine life, unique ethnic societies and their religions, rites, dances, rituals and daily life - will be explored throughout the Pacific and Indian Oceans. Pictures and commentary will range widely across Micronesia and Polynesia (Hawaii, Tahiti, Moorea, Bora Bora, Samoa, the Gilbert Islands, Tonga) to Melanesia (the Solomons, New Guinea, Rabaul) and on into Indonesia (Sumatra, Nias, Java, Bali) as well as to Mauritius, the Maldives, Madagascar, and more! DON'T MISS this special event.

(We encourage all NYSC members to make a special effort to come and enjoy this very special presentation. Thanks to Al Scarpetti for making this spectacle possible).

COMING ATTRACTIONS, Part 3: AMU and COA meetings, both in Texas

The 60th Annual Meeting of the American Malacological Union will be held July 9 to 14, 1994 at the Hyatt Regency, downtown Houston. President Constance E. Boone has planned a detailed scientific program, including contributed papers, poster session, Gulf Symposium, Unionid Workshop, Bourse, Business Meeting, and Auction. Festive activities are abundant - President's Reception, ranch and barbeque, museum fiesta dinner and Conch's Country Caper [annual banquet]. This should be an especially fine meeting. Plan to spend this week in Houston and the following week at the

22nd Annual Convention of the Conchologists of America, July 17-23 at the Marriott Bayfront Hotel, Corpus Christi. Early Registration, Bargain Table and two programs start off this fun-filled week. Opening ceremonies, programs and a Welcome Fiesta are Monday's events. Club sales, programs, Annual Business Meeting and a sunset cruise on Corpus Christi Bay occupy Tuesday's hours. Programs, club sales, the annual auction (an afternoon event for the first time) fill Wednesday, while a tour of the Texas State Aquarium will precede the much-awaited Dealer's Bourse on Thursday. The Bourse continues on Friday, followed by a behind the scenes tour of the Corpus Christi Museum of Science and History and the Annual Banquet. Saturday offers a varied schedule from which to choose: a dive trip to offshore platformsl a golf outing, or a bus trip to Padre Island National Seashore.

Those wishing information on these gatherings should contact Walter Sage at the American Museum at 212-769-5717. You will be sure to enjoy both meetings. And be prepared for even more exotic destinations in 1995: AMU will convene on Hawaii's Big Island (called Hawaii) and COA will meet in San Diego. These conventions are so activity-filled that you need a vacation when you get home. DON'T MISS THEM!!

lethal genetic characteristic;[60] however, he wrote that the same effect "probably" can result from irritation or injury.

To see the difference between true sinistrality and dextral hyperstrophy (the 2 left-handed coiling types, Figures 7A&D) look at a dextral, orthostrophic shell (the commonest kind) (Figure 7B) in a mirror. Hold the coiling axis of the dextral shell parallel to the mirror's surface and you will see a sinistral shell (the dextral shell's mirror image). Now, hold the shell so that in basal view the coiling axis is at right angles to the mirror. What you see in the mirror is hyperstrophy.

It is ambiguous to state that a left-handed gastropod has undergone an unqualified "reversal" because both orthostrophic sinistrality and hyperstrophic dextrality have, in different senses, undergone reversals. (Total) sinistrality is a mirror-image reversal, while dextral hyperstrophy is movement of the whole anterior body and aperture to the animal's right. Thus, in hyperstrophy the anterior and posterior siphons and other asymmetrical, external body parts such as the penis still remain in the same relative positions, not transposed (Figures 7A–D).

True (anatomical) sinsitrality entails a mirror-image reversal of not only the shell and operculum but of the asymmetrical animal as well. Some right-handed (hyperstrophic) animals in left-handed shells are misleadingly called sinistral. If they were chemicals, some snails would be called enantiomorphic.

HETEROSTROPHY

Larval hyperstrophy (heterostrophy) followed by orthostrophy is not uncommon. Type B larval shells of sea slugs (nudibranchs) and their shelled relatives are heterostrophic (left-handed).[63,71] The left-handed (but dextral!) larvae retaining a shell into adulthood metamorphose to right-handedness when they leave the plankton and become bottom-dwellers. Thus many more shells in the plankton than on the bottom are left-handed (mainly dextral and hyperstrophic).[71]

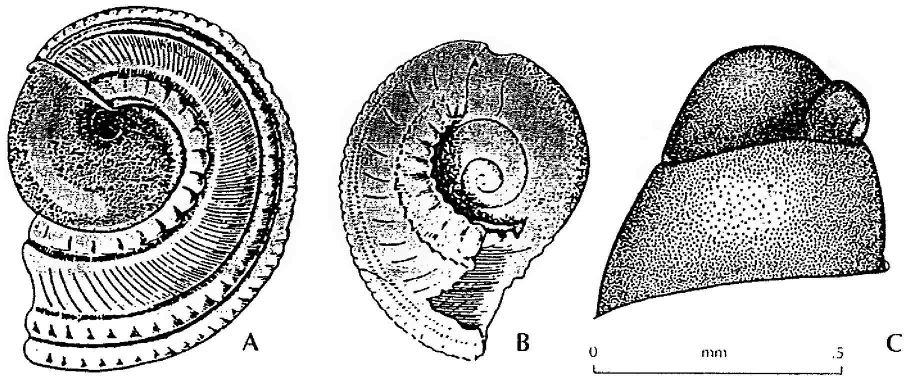


Figure 11.
Heterostrophic (hyperstrophic) protoconchs and young postlarval orthostrophic teleoconchs. A&B: The sundial snail Architectonica *sp (from C Hedley*[22]*). Marine, southeastern Australia. C: The pyramidellid* Odostomia acuta. *Marine, Europe (from G Thorson*[71]*).*

If the spire of a post-larval shell (teleoconch) is high and there is no umbilicus, as in most Pyramidellidae (Figures 11C&13B) except *Cyclostremella*,[25,43,61] a heterostrophic protoconch (larval shell) coiling axis is vaguely at right angles to the teleoconch axis (Figure 7F). If a teleoconch spire is low and the umbilicus is wide, as in the Architectonicidae (Figure 11A&B, 13A) and *Cyclostremella*, the "false" spire of the protoconch can be seen through the teleoconch umbilicus. Even here, the protoconch and teleoconch axes are 10 to 15° apart (Figure 13A).[62]

Coiling Frequencies and Ambidextrality

"Normal" and "abnormal" coilings are here defined as occurring, respectively, in >99% or <1% of a population. If a coiling frequency is between 1

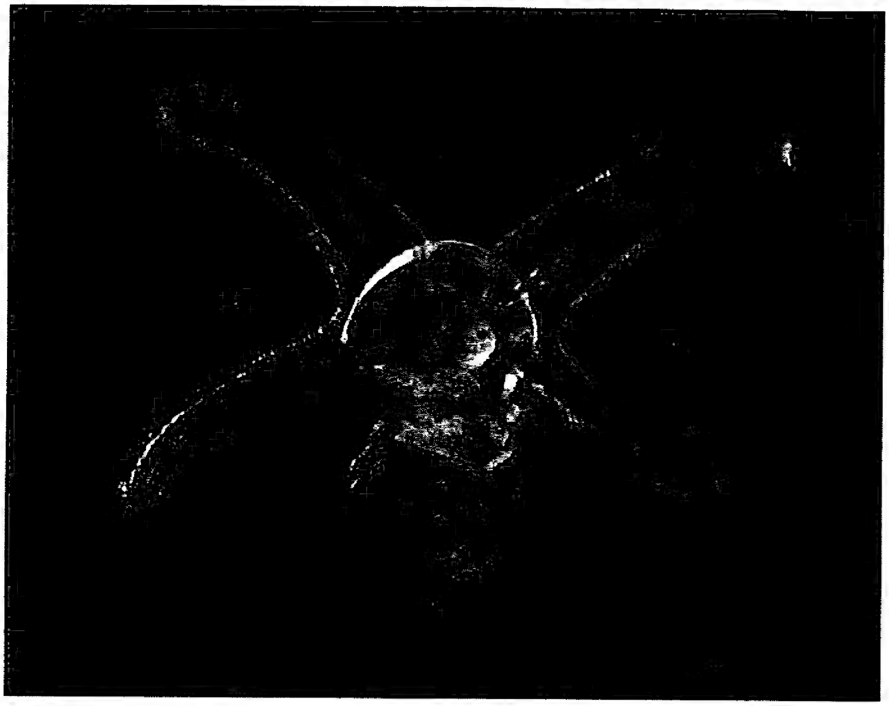


Figure 12.
The sundial snail Philippia (Psilaxis) krebsii. *Swimming hyperstrophic veliger (when completely grown, the velar lobes are much longer). Marine, planktonic, tropical North Atlantic Ocean.*
ROBERT ROBERTSON

and 99%, the species is called ambidextrous, dextrals and sinistrals occurring frequently together. Examples of genera that contain ambidextrous species (all of them tropical pulmonate tree snails) are *Achatinella*, *Partula* (Figure 17), *Liguus* (Figure 18), and *Amphidromus*. Recent literature is extensive on the genetics of coiling in *Partula*, Polynesian landsnails.[7,29,30,32,46–48] Conspecific dextral and sinistral *Partula* have behavioral and anatomical difficulties in mating,[37] but this does not favor within-population speciation.[31] Apparently all ambidextrous species have both normally dextral and normally sinistral congeners (close relatives).[16]

Taxonomic Occurrence

The 2 most common modes of coiling among gastropods are orthostrophic dextrality and heterostrophy, occurring, respectively, in 82.9% and 8.2% of all 5784 Recent (living) genera and subgenera.[70,76,77]

The pattern of taxonomic occurrence of the main coiling types is complex, and even normal and abnormal handedness are prevalent in different groups (Table 1).

Normal dextrality presumably is more primitive than normal sinistrality, and abnormal sinistrality presumably precedes the evolution of normal sinistrality. Curiously, though, many more Recent gastropod genera and subgenera are normally sinistral (365) than abnormally sinistral (122). Thus it would appear that abnormal sinistrality is an evolutionary bottleneck between the 2 normal coiling types.

The 4 main theoretically possible kinds of snail coiling directions (Figure 7A–D) are all represented among living gastropods, but with greatly varying frequencies. The coiling types are far from randomly distributed through the class Gastropoda (Table 1).

The great majority of living snail species and individuals are normally dextral and orthostrophic (Figure 7B). Sinistral orthostrophy (Figure 7A) is of spotty occurrence, appearing in a wide array of taxa.

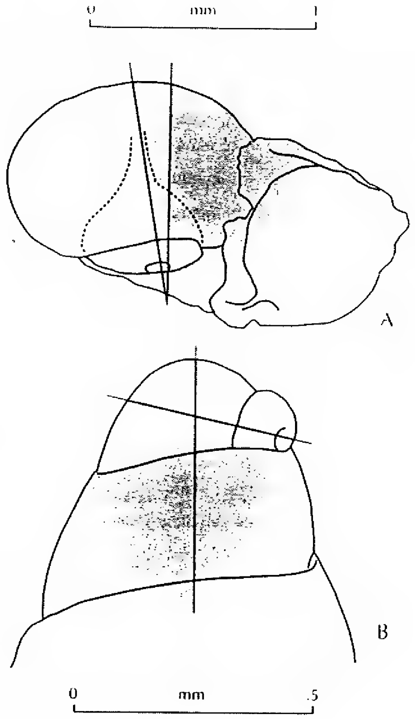
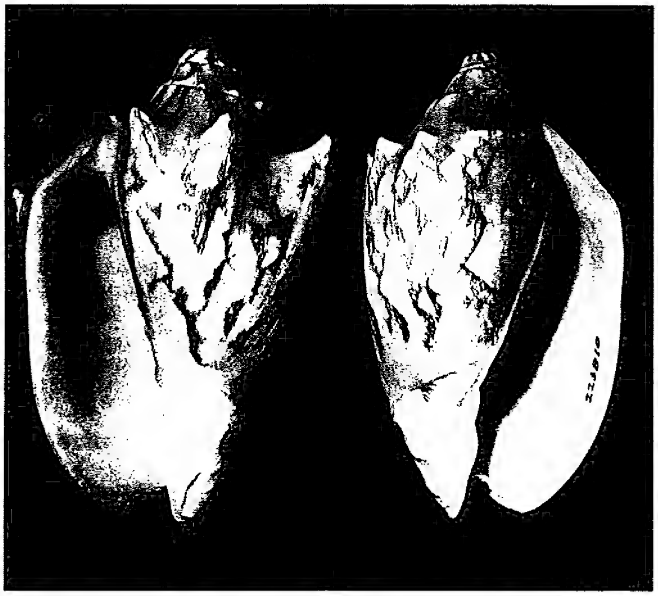


Figure 13.
Outlines of heterostrophic protoconchs with their coiling axes indicated. A, Young postlarval sundial snail Philippia (Psilaxis) krebsii. *Marine, tropical North Atlantic Ocean. B, The pyramidellid* Odostomia acuta. *The 2 teleoconch coiling axes are shown vertical, contrasting with the tilted protoconch axes. Note the angles between each pair of axes. Both marine. Both after R Robertson,[62] B originally from G Thorson.[71]*



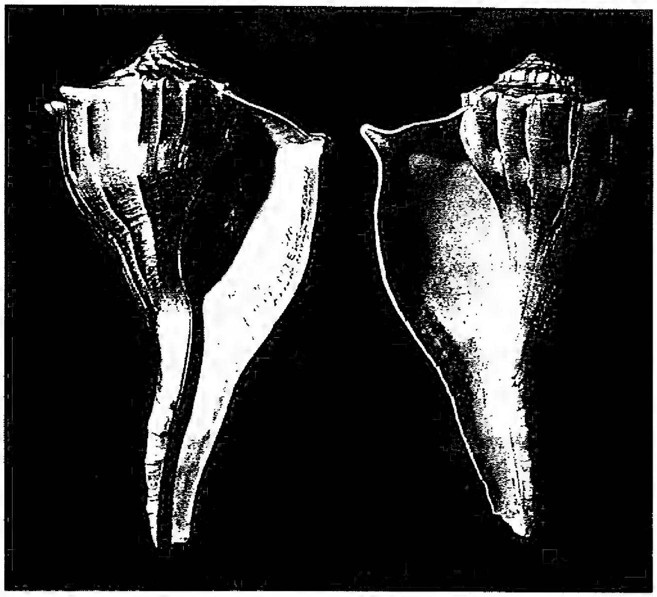


Figure 14. (left)
The volute Cymbiola vespertilio. *Normally dextral (right), abnormally sinistral (left), both orthostrophic. Marine, Philippines.*

Figure 15. (right)
The whelk Busycon (Sinistrofulgur) contrarium. *Normally sinistral (right), abnormally dextral (left), both orthostrophic. Marine, west Florida.*
ROBERT ROBERTSON, BOTH

Dextral hyperstrophy (Figure 7D) is not uncommon among larvae (heterostrophy) (Figure 7F). Benthic dextral hyperstrophy (Figure 7D), however, which can be normal (*Lanistes*) (Figures 1&10) or abnormal (*Heliacus*),[64] is rare among modern snails. In the latter case, the normal larval hyperstrophy is retained abnormally into adulthood.

Only 2 cases have been reported of abnormal, post-larval dextral hyperstrophy with presumably orthostrophic protoconchs: in a *Nodilittorina*[19] and a *Janthina*.[35] These did not involve hyperstrophy retained from the larval stage.

Sinistral hyperstrophy, with right-handed coiling (Figure 7C), occurs only in, but in many taxa of, the Planorbidae, including: western North American *Carinifex* (Figure 21),[49] and Lake Baikal *Choanomphalus*.[26] Normal sinistral heterostrophy occurs only in *Blauneria* (Figures 7F&20).[20,39,40]

P Pelseneer,[54] among others, has listed the species known to be normally or abnormally "sinistral." Even recently, the term "sinistral" has been commonly and uncritically used for all left-handed shells, which does away with the dextral–sinistral, orthostrophy–hyperstrophy terminology.[33] There are no established alternatives. "Left-handed" serves as a useful vague term if this is needed for the shell alone (Figure 7).

Considering 1st some strictly orthostrophic groups: The Australian top shell *Calliostoma (Sinutor)* is normally (or abnormally?) sinistral. This case appears to be unique in living archaeogastropods, but conditions were very different in the Paleozoic—their heyday—when coiling was more "experimental" than now.[34] What brought about the present supremacy of dextral orthostrophy?

In *Busycon* (American whelks) there are several normally dextral and apparently 2 normally sinistral species, some if not all of which have total anatomical reversals abnormally[56] (Figure 15). As an abnormality, sinistrality occurs rarely in many gastropod species.

The fossil and Recent neogastropod family Marginellidae is unusually prone to abnormal sinistrality, but no normally sinistral marginellid is known.[8]

Except for 3 normally dextral genera,[41] all the Triphoridae are sinistral normally (Figure 4). Abnormal triphorid dextrality could exist but is

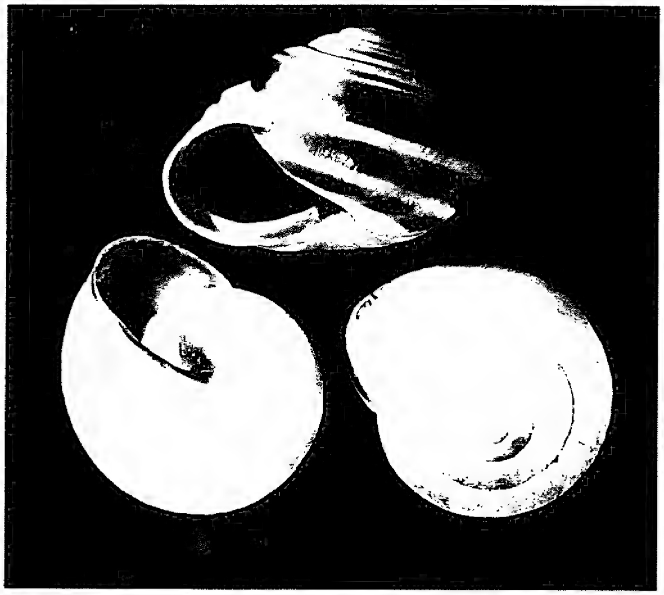


Figure 16. (left)
The banded snail Cepaea nemoralis. *Three exceedingly rare, abnormally sinistral, orthostrophic shells. Land, County Donegal, Ireland.*

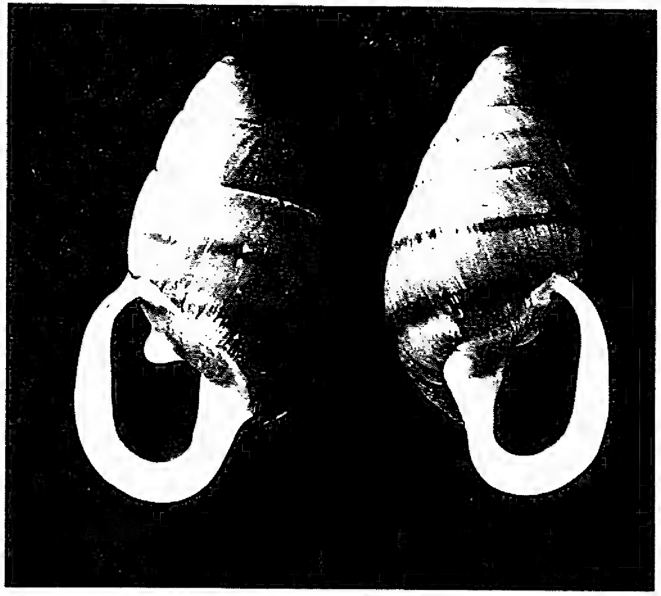


Figure 17. (right)
Partula suturalis. *Ambidextrous; sinistral (left), dextral (right), both orthostrophic. Land, Moorea, Polynesia.*
ROBERT ROBERTSON, BOTH

unknown. Such a shell might be mistaken for a normally dextral *Cerithiopsis*, which is otherwise similar.

Pterotrachea is an advanced, almost bilaterally symmetrical (planktonic) heteropod which has no postlarval shell. P Pelseneer found all the embryos in 1 of several egg masses to have cleaved inversely.[53] In other words, the young were abnormally sinistral. Whether they would have survived to maturity is unknown. So far as I can ascertain, all heteropods are normally dextral.[67]

A shell-less animal can be abnormally sinistral. Some shell-less land slugs very rarely have right and left body halves reversed, a kind of "coiling" reversal. These slugs normally have the opening to the lung on the right side of the body. Just 2 publications report land-slug lung openings on the left, in *Limax* and *Arion*, both dating from the last century.[5,66]

Heterostrophy (larval hyperstrophy) occurs in (all?) the Architectonicidae (sundials) and Mathildidae, some (but not all) Pyramidellidae with planktonic larvae, and many of their opisthobranch and lower pulmonate kin (details are in Robertson[63]). The functional role that heterostrophy plays in the life of these animals remains unknown.

The South American brackish- to freshwater basommatophoran pulmonate *Chilina* is the only known case of non-marine heterostrophy.[59] Four abnormally sinistral *Chilina* shells[42] presumably had reversed heterostrophy but their apexes appear corroded. The abnormal protoconch must have been, like normal *Blauneria*, right-handed or "pseudodextral." The 4 postlarval chilinas could not have been abnormally dextral and hyperstrophic because of the 2 slight folds low on the columella (shell pillar), which are where they should be with sinistrality, not hyperstrophy.

In some families such as the Epitoniidae (wentletraps) and Coralliophilidae, hyperstrophy and sinistrality are utterly unknown, but may nevertheless occur at extremely low frequencies (Figure 2). Very low abnormal coiling frequencies have yet to be adequately quantified for any gastropod species. They may be in the order of 1 in a million or more, and the usual museum or other scientific sampling of any species is far below that. A complication is that frequencies commonly vary from 1 locality to another. Some places are renowned for the relative

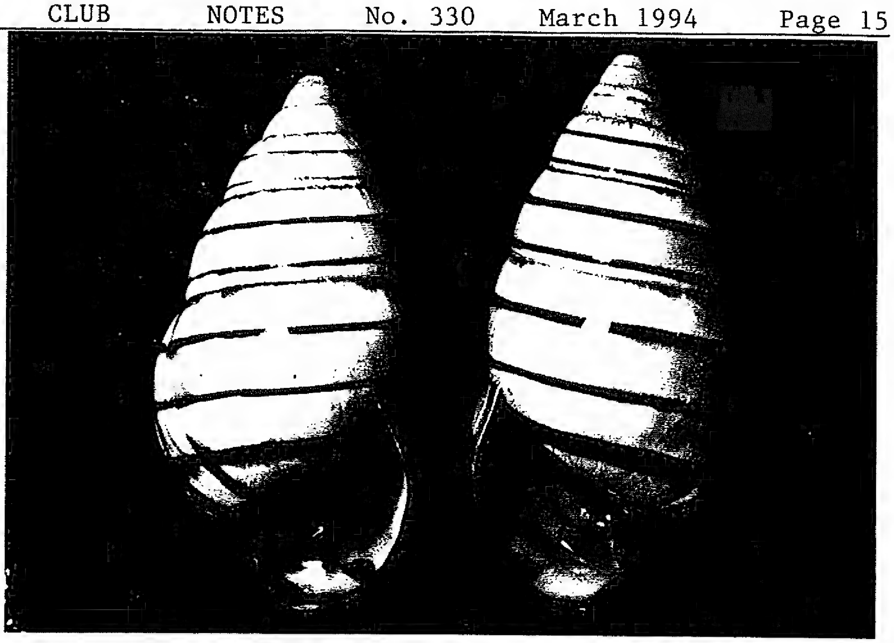


Figure 18.
A banded tree snail Liguus vittatus. *Ambidextrous; dextral (left), sinistral (right), both orthostrophic. Land, Cuba.*
ROBERT ROBERTSON

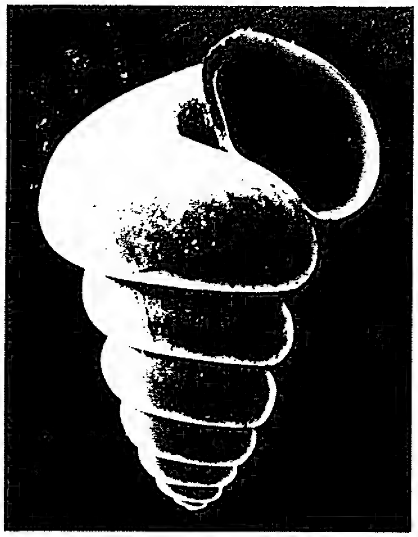


Figure 19.
Shell of the sea butterfly (thecosomatous pteropod) Limacina retroversa. *Dextral and hyperstrophic. Scanning electron micrograph. Marine, holoplanktonic, Western South Atlantic Ocean. Shell 3.3 mm long.*
NORMAN MAGALDI

abundance of sinistrals of a particular species,[13,54] but a correlation with ecology seems unlikely.

The Planorbidae apparently are all anatomically sinistral.[3,27] Most have planispiral shells that are also slightly hyperstrophic. A Hyatt has documented the great range in form of planorbid shells at one locality over a short period of geologic time.[28] L Piré has recorded the shell "plasticity" of 1 species of *Hippeutis*.[55] There is gradation from slight orthostrophy, through planispirality, to moderate, strong, and scalariform[4,60] hyperstrophy (note also *Carinifex*, *Choanomphalus*).

True (anatomical) sinistrality, both normal and abnormal, is completely unknown in the whole subclass Opisthobranchia.[16] Adult *Limacina*, a left-handed thecosome pteropod (Figure 19), is dextral and hyperstrophic (like many larvae of related taxa).

Hyperstrophy and heterostrophy have not yet been convincingly reported in living Archaeogastropoda, Neogastropoda, and stylommatophoran Pulmonata, but in the last group normal and abnormal sinistrality occur not infrequently but near planispirality rarely, eg *Bostryx (Discobostryx)* (Figure 9). Some species of *Cochlorina*, whose apertures are drawn up the spire, and *Anostoma* and *Hendersoniella*, with swollen or discoidal shells with upturned apertures, come closest to hyperstrophy. Some "sinistral" stylommatophorans may turn out to be normally or abnormally hyperstrophic.

Discussion

SINISTRALS AT A DISADVANTAGE?

It could make no difference to a snail whether it is dextral or sinistral if it is an exact mirror image (as GJ Vermeij believed[75]). It may be telling, though, that in gastropods generally there are many more dextral than sinistral species and individuals. Conceivably, heterostrophy confers some unknown benefit(s) in the plankton, but benthic hyperstrophy may entail locomotory and sanitary problems.

The freshwater, live-bearing prosobranch *Campeloma* has significantly higher frequencies of sinistral embryos in utero than adults in the wild, the sinistrals here having been naturally selected out.[72] Here, sinistrality appears to be deleterious.

True sinistrality is completely unknown in the subclass Opisthobranchia; left-handed opisthobranch larvae metamorphose to right-handedness when they leave the plankton and become bottom-dwellers.

SJ Gould and coworkers[17] have shown that in the mainly West Indian land snail *Cerion*, sinistral shells are very rare (only 6 are known) and these deviate slightly from the norms of dextrals if measurements are compared. Thus, reversal does not necessarily produce *exact* mirror images and there may be "consequences of being different" (to use part of Gould et al's title). However, Gould (in litt) does not "think that the data like [his] for *Cerion* on the slight teratology [abnormality] of sinistrals should be viewed as an argument for the general disadvantage of left-handed coiling."

Other, less convincing data on the shells of a few other gastropods suggest that such deviations may be prevalent among abnormal sinistrals. Intentionally reversed photographs are potentially helpful in viewing this (Figure 20 right).

Quantified microanatomical comparisons have yet to be performed on dextral and sinistral specimens of positively the same gastropod species. AE Savage[65] took a step in the right direction by comparing minutely the nervous systems of normal and abnormal specimens of the same species of *Campeloma* (she found no difference except total reversal). It is conceivable that sinistral anatomy might reveal more deviations from the norm, and perhaps even selectively disadvantageous traits.

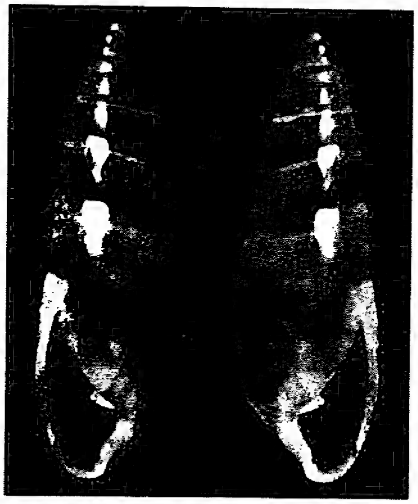


Figure 20.
The ellobiid Blauneria heteroclita. *Sinistral and heterostrophic. Whole sinistral shell as it actually is (left), and with the photographic negative intentionally reversed (right). True dextrals are unknown in this genus. Shell 3.9 mm long. Supra-tidal; larvae marine, development direct. Bahamas.*
ROBERT ROBERTSON

OTHER "SINISTRAL" ANIMALS

Other animals may show similar coiling phenomena that affect their whole bodies.[38] Some foraminiferan species (shelled protozoans) are both dextral and sinistral; temperature change seems to be the main factor triggering coiling frequency change.[15,18,74] This does not happen to snails.

The hinge teeth of bivalve mollusks, which of necessity are asymmetrical since they interlock, may have some or all of the teeth reversed.[2,9,21] When only some of the teeth are reversed there may have been mosaic transposals, reversals of only small parts of the animal—which are unknown in gastropods. Comparable mosaics have been recorded in various vertebrates.

CAUSALITY

The cause of sinistrality has been explained in various ways, so far unsatisfactorily. In a general article on handedness, RA Hegstrom and DK Kondepudi state:

> *Atoms and molecules... are asymmetric with respect to left and right, but this has not yet been plausibly linked to the handedness of living objects.... The answers to questions about handedness in snails, human beings, cabbages and kings will have to await further revelations from developmental and evolutionary biology.*[23:115]

4, NOT 2 KINDS OF SNAIL COILING

With precise bilateral symmetry, how would total anatomical reversals be detected? Snails are renowned for their asymmetric coiling. Left-handedness among them is obvious to most people. Potentially and actually, there are 4 (5 or 6 including heterostrophy), not 2, kinds of gastropod coiling even in recent times (Figures 7A–F). DM Raup[57] has shown with computer simulation that some theoretically possible shell shapes do not exist among fossil or Recent gastropods. Not so snail handedness: All the possibilities occur.

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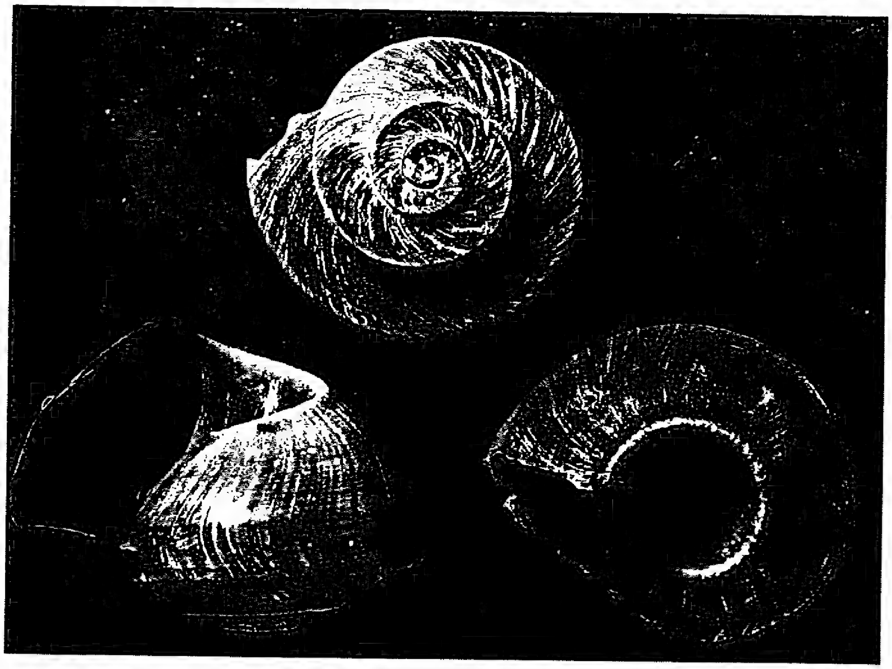

Figure 21.
The planorbid Carinifex newberryi. *Sinistral and hyperstrophic (pseudodextral). Freshwater, Shasta County, California.*
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Data Labels; The Tragedy And The Comedy

by Bill Frank (Jacksonville Shell-o-Gram, Jan. 1994)

As the organizer of the shell clubs monthly raffle, I have access to literally thousands of world-wide shells from a multitude of collectors, most of whom are long-deceased. Processing these shells and getting them ready for the monthly raffle or periodic club auction is interesting, educational, and occasionally humorous. At times, though, this task is quite frustrating because the data labels are illegible or incomplete.

It seems that virtually every collector had his/her own method of recording data. These range from neatly typed or printed labels to illegibly-scribbled notes on every kind of paper imaginable. Often neither the species name nor the actual locality data is legible despite the use of a magnifying glass by one whose handwriting is notoriously bad.

I am sure that most, if not all, of these dedicated longtime collectors never gave any serious thought as to what might happen to their treasured collections after their ascending to the big reef in the sky. Shells last virtually forever; the persistence of people is much more finite.

After the passing of the dedicated collector, probably a family member with no interest at all in shells suddenly finds himself with something of some monetary and scientific value but still quite difficult to dispose of.

At this point, all or part of the collection may be donated to a museum or sold to another collector for just a fraction of its true worth. A more likely scenario in a lot of cases is that the collection will be donated to the deceased's local shell club and subsequently used in a project such as the monthly raffle or possibly be the unpopular highlight of a neighborhood yard sale.

If your collection is worth spending a lifetime assembling, it is certainly worth taking the extra few minutes to prepare a proper data label that is legible to those who may ultimately benefit from/enjoy your life's passion.

It's uncanny at times how much you can learn of a persons life just by the examination of their collection and labels. It is also discouraging to see the changes in the environment (usually for the worse) for a location that you shell periodically. For example, very large Murex fulvescens could be found in three inches of water feeding on Mercenaria mercenaria at Ft. George Inlet near the bridge during 1977. Today you would be lucky to find a Mercenaria. Severe erosion, combined with probably poorer water quality, has destroyed the local fauna in a manner noticeable over the past several years.

Occasionally there is some humor or entertainment value in data labels. One such neatly handwritten label of the late Frank Lyman of Fernandina Beach illustrates this point quite well:

> "Neritina pulligera Lamarck, 1758
> By diving at mouth of Johnstone River
> near Innisfail, Far North Queensland,
> Aug. 18th, 1973. Paul Pini collector,
> via Gwen Pini. Mrs. Pini insists that
> teenage Paul, must take his sister along
> to sit in the boat and watch for a 12'
> Crocodile that lurks about river mouth.
> No Croc. = Paul dives!"

I don't know about you, but if I had the choice of a rare specimen with general locality data and this common Neritina, I would take the latter. You can almost picture young Paul and his sister as they collect the specimen from data label information, 20 years after the fact.

A dealer might turn his nose up at such a specimen lot, but you have to admit that it certainly is much more interesting than a vast majority of labels that you usually see.

FLOOD SWEPT TINY TROUBLEMAKERS - ZEBRA MUSSELS - TO MIDWEST

(By Laurie Goering, Chicago Tribune; reprinted from The Orlando Sentinel, Saturday, December 11, 1993)

CHAMPAIGN, Ill. - The Zebra Mussel, that scourge of the Great Lakes, is about to become the scourge of the Midwest.

Riding the Great Flood of '93, the pests have floated from Lake Michigan to St. Louis - and undoubtedly farther - years earlier than expected.

On the Illinois River near Havana, Ill., where only a handful of mussels lived last year, mallard ducks are gorging themselves on the tiny invaders, leading duck hunters to complain that their unusually fat prey have a repulsive fishy taste, biologists say.

Near Grafton, Ill., populations of up to 94,000 Zebra Mussels per square meter are threatening to clog water intake pipes once expected to be safe for years, and will cost towns, factories and power plants millions collectively to clean them out.

All along the Illinois River, the tiny foreign invaders have begun an assault on the state's rare native mussels, threatening to drive them all to extinction within a few years, and to cripple Japan's $800 million cultured pearl industry that depends on Midwestern mussel shells for its raw material.

"Without a doubt, it is a major ecological disaster," said Doug Blodgett, a biologist with the Illinois Natural History Survey who has been monitoring the invasion.

Since 1988, when the tiny European shellfish were first discovered in Lake St. Claire, the pests have become rapid travelers, infesting every one of the Great Lakes by 1991. Scientists believe they were carried to the Great Lakes in the ballast water of freighters.

Also in 1991, the area's first Zebra Mussel was found in a side channel of the Illinois River south of Havana, Ill., having apparently traveled down one of several artificial canals linking the Chicago River and the Illinois River.

During the past two years, the mussels have slowly spread south on the Illinois River, their numbers reaching up to 650 mussels per square meter at test sites last year.

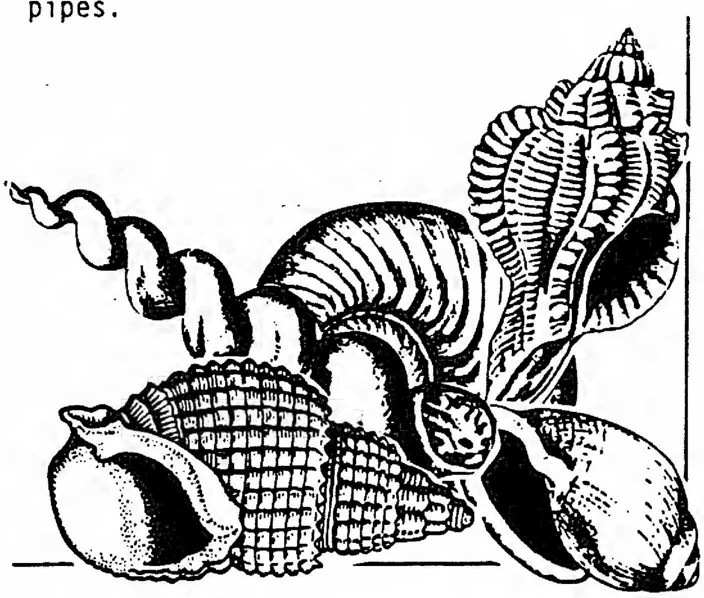
Then came the flood.

Zebra Mussels, which routinely spawn up to five times a year and can release a million eggs each time, took advantage of the high, fast-moving waters to send trillions of tiny larval offspring floating far downstream, experts said.

The larvae, which travel five to 30 days before settling into a new home and growing shells, went farther and faster than ever before. They made it to the Mississippi River. They rode the floodwaters over riverbanks and levees, sweeping into the backwaters of creeks, into sewage treatment plants and into lakes and ponds.

Experts looking for ways to control the Zebra Mussels' spread have talked about everything from heating the river water at locks in an effort to kill the free-floating larvae to developing synthetic attractants that would draw them to traps and away from sensitive water intake pipes.

(Zebra mussels are now in Louisiana - ed)



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(Central Florida Shell News, January 1994)

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The Treasurer-Membership Chairman should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS - 1993 - 1994

PLEASE NOTE: There are differences in the date and place for the September and April meetings. The September meeting will be on Sunday, September 26 at 2 P.M. in the Blum Classroom at the Museum, and our April meeting will be on April 10, 1994, our annual Social/Auction. Consult the current edition of the NOTES for confirmation of date, day and time of each meeting.

September 26, 1993
October 10, 1993
November 14, 1993
December 12, 1993
January 9, 1994
February 13, 1994
March 13, 1994
April 10, 1994
May 8, 1994
June 12, 1994

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, except our Social/Auction (and the September meeting as noted above.)

On our meeting days, you may gain admission to the Museum without paying a fee by presenting your New York Shell Club membership card.

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September to June, room 319 of the American Museum of Natural History, New York City (unless otherwise advised). Present NYSC membership card for admission on meeting dates.

PROGRAM SCHEDULE

SUNDAY, June 13, 1994 at 2:00 p.m. - Mel & Sylvia Springer, world travelers in their own right, will share with us a slide program - "Touring in Thailand" - please plan to join us.

President Al Scarpetti is actively planning the programs for the Fall meetings. Details will be announced in the September issue. If you would like to give a program or have suggestions for programs or field trips, please see Al at one of the meetings or give him a call at 212-929-7430.

I have to apologize to all NYSC members for the late arrival of this issue and the September issue as well. I have been increasingly busy with work at the museum, with my duties as COA Treasurer, with travel on museum business and with family matters. I trust things will "settle down" soon and I can get back to normal. I expect to get the NOTES out on schedule through the June 1995 issue. We will have to decide how to proceed after that, as I may not be able to continue to prepare these NOTES after that date. Any suggestions for the future are welcomed - the NOTES are a club publication, not my personal property, and we need increased club involvement if we are to go on.

With all the turmoil in my working life of late, I can find only the meeting highlights for the March meeting in the piles of paper in my office. I have some people to thank for the success of the April social and the handout from the speaker for the May meeting. As you may remember, there was no February meeting this year due to the snow, so no meeting highlights are available. As we get organized, we will catch up on the highlights by the December NOTES.

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We are most pleased to report that Ed Cowles was elected NYSC President at the June meeting. Thanks are extebded to Ed for again taking on this responsibility and to Past President Al Scarpetti for his years of faithful service. Al will continue to work on programs for NYSC meeting - you will see what he has worked out as printed in the September NOTES.

HIGHLIGHTS OF RECENT MEETINGS

FEBRUARY 13: The meeting was cancelled due to the heavy snowfall.

MARCH 13: President Al Scarpetti commented on the process on informing members that the February meeting had been cancelled on short notice because of the snow and ice that made travel difficult and dangerous. He then extended thank-you to Walter Sage for the hard work he has put into the production of an excellent series of Shell Notes.

Following her financial report, Treasurer Theta Lourbacos noted that a library in Frankfurt-am-Main, Germany has ordered back issues of the Notes from 1990 on, and has entered a subscription.

The Shell-of-the-Month, presented by Romuald Czepulkowski, was *Charonia lampas rubicunda*, form *powelli* Cotton, 1957. The shell he displayed, from Queensland, Australia, measures 2 inches, which is half normal size.

Al reported that an announcement of the May meeting, featuring Waldemar Hansen, would be faxed to the N. Y. Times by Larry Potter. Al noted that May 9 will be Dorothy Raeihle's 85th birthday, and that everyone will be asked to sign a card at the April meeting. At that meeting, further details concerning the behind-the-scenes aquarium tour would be announced.

Nick Katsaras displayed four species of *Epitonium* - *acuminata*, *varicosa*, *communis* and *coronatus*, and an *Amaea magnifica* measuring 126 mm - almost record size. He recalled having left his sweater behind in the Englewood, N. J. library recently. In the pocket was a *Voluta bednalli*. He was back there early the next morning and retrieved both. He also displayed several photos of club members of bygone years.

The doorprizes were a copy of "The World of Shells," by Scase and Storey, won by Nick Katsaras; "New Zealand Seashells in Color," won by Rich Kelly; *Oliva incrassata*, won by Larry Potter; and *Turbo canaliculatus*, won by David Epstein.

The speaker was Rich Kelly, who described, with slide photos, a shelling trip to St. John's, Newfoundland, in 1991. His localities were on the Avalon and Burin peninsulas, where in early August, it was cold. Among the prizes were limpets, *Littorina*, *Margarita*, *Turritella* and *Hiatella*. Dredging at 150 feet was strenuous work, but brought up *Trichotropis*, turrids, *Astarte*, *Nucella*,*Lunatia*, *Macoma*, *Mya*, *Modiolus*, *Mytilus* and brachiopods.

Rich also described some shelling at St. John, away from the sea. Land collecting yielded *Cepaea*, *Succinea*, *Trichia*, *Cochlicopa*, *Oxychilus*, *Vallonia* and *Zonitoides*. Streams of the area gave up *Helisoma* and *Stagnicola*. Rich ended his talk with photos of butterfiles and birds of the area.

APRIL 10: The annual auction and social was a very pleasant event for all and we added substantially to the treasury while enjoying Sol Weiss and his spirited auction. Weare grateful to the following individuals - Allen Aigen, John Cole, Ed Cowles, Vincent Cusumano, Romuald Czepulkowski, Carl Ehrlich, Harvey Frajlich, Sam Freed, Henry Gordon, Nick Katsaras, Arline & Hans Reimann, Walter Sage, Al Scarpetti, Rae Varga, and Sol Weiss - and dealers R. Tucker Abbott (American Malacologists), Marty Gill (Shamaron Shells), Bob & Dottie Janowsky (Mal de Mer Enterprises), Mique & Pinky Pinkerton (Mique's Mollusks), Dan Spelling (Specimen Shells Sales) and Victor Wee for their donations that made the auction a success. And we naturally thank all who attended and those who worked that day for their contributions to this worthwhile cause. We have received shells from Leon Juster for the 1995 auction, and we urge all NYSC members to search their cabinets for the hidden treasures you can contribute to the 1995 auction. Please start thinking ahead to next April - we need to count on all of you.

THE SEARCH FOR PARADISE

THE PACIFIC OCEAN AND ITS ISLANDS

DEFINITIONS: POLYNESIA, MELANESIA, MICRONESIA, ANGLONESIA

The Pacific Ocean is vast--bigger in area than all the land on earth, bigger than the Atlantic, Indian, and Arctic Oceans put together! Some 10,000 islands lie scattered across the watery immensity of OCEANIA (that part of the Pacific east of Indonesia and the Philippines), ranging from tiny atolls to the continental island of Australia and the sizeable twin-island domain of New Zealand.

Scientists conveniently divide the islands of this mighty Pacific into deducible ethnic areas. A huge imaginary billiard rack laid down with Hawaii at its apex and New Zealand and Easter Island at its lower left and right corners would enclose the famous "Polynesian Triangle"; within this area lie the islands of POLYNESIA, a word of Greek derivation literally meaning "many islands." Generally speaking, the peoples of Polynesia have light brown skins, wavy hair, and similar languages and cultures. Hawaii, French Polynesia (Tahiti, Moorea, Bora Bora, the Marquesas), the Cook Islands (Rarotonga), Tonga, Samoa (both American and Western) are all part of Polynesia.

West of Polynesia may be found MELANESIA (literally "black islands"), a sector which embraces Fiji as well as New Guinea and Rabaul, the Solomon Islands, Vanuatu, and New Caledonia. Here skins are much darker, hair tends to be frizzy, and cultural patterns have included quondam cannibalism. Interestingly enough, malaria exists in Melanesia but not in Polynesia--as though the 180th meridian were a deciding factor!

North of Melanesia and west of Polynesia lies MICRONESIA (literally "small islands"), a Pacific stretch which embraces Guam, the Carolines and the Marshalls, the Marianas, Saipan, and the Republic of Kiribati (Kiribati now comprises the Gilberts, the Phoenix, and the Line Islands such as Christmas Island). Micronesia's inhabitants are usually of quasi-Polynesian ethnic and cultural origin.

ANGLONESIA (literally "English islands") strictly refers only to Australia and New Zealand, which as a result of 19th-century British settlement are now in the 20th century largely populated by persons of English descent. (Actually, New Zealand historically constituted a part of Polynesia, since the ancestors of its indigenous Maoris were indeed Polynesian. By contrast, Australia's indigenous aborigines represent a separate ethnic entity from Pacific Island peoples.)

These Pacific Island divisions have proved useful, though today's sophisticated anthropologists no longer draw arbitrary conclusions about race, languages, or culture. there has been much overlapping in the Pacific, and much remains hypothetical about its inhabitants--where they came from, how they originally reached islands hundreds or even thousands of miles apart, and how they developed astonishingly complex societies and art.

PACIFIC ISLAND HISTORY IN A COCONUT SHELL

Europeans from Magellan onward did not discover Oceania--its native inhabitants, wherever they came from, arrived many hundreds or even thousands of years before.

Geological evidence suggests that an ancient Melanesian continental shelf once extended into the Pacific from Asia. Melanesia's inhabitants are presumed to have derived from prehistoric migrations and genetic intermingling of Negroid, Ainoid, and Veddoid types, with the Negroid type predominating.

Polynesia represents a more complicated problem. Its peoples have certain affinities with composite Mongoloid types of Southeast Asia. Scientists speculate that Polynesian "migrations" (via central Melanesia with some intermixing of blood and languages) took

(continued overleaf)

(This and the following page accompanied Waldemar Hansen's talk at the May meeting) place from about 2,000 B.C. onward, and slowly but surely populated the far-flung islands of Polynesia and Micronesia. A number of colorful theories (Thor Heyerdahl's notion of a South American Indian origin, or Sir Peter Buck's ascription of master-mariner abilities to Polynesians deliberately moving outward from cultural centers such as Samoa) cannot survive new evidence. Less fancifully, scientists now believe these "migrations" were not calculated or planned, but occurred over millennia as accidents (canoes blown off course by storms)! Whatever the truth, no one denies that the Polynesians were resourceful.

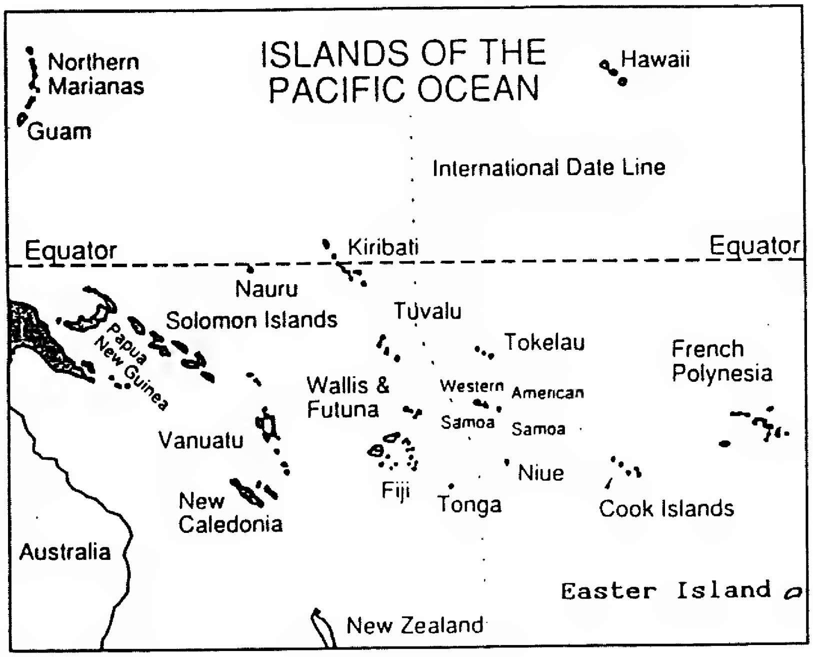
In the 16th, 17th and 18th centuries (the so-called "Era of Discovery"), persistent European explorers--first the Spanish and Portuguese, then the Dutch and British and French--reached all the islands of Oceania. With the white man's "fatal impact" came sex-starved whalers, strait-laced missionaries, eager traders, and overt South Seas exploitation as planters and miners, blackbirders (unscrupulous labor recruiters) and chiseling merchants moved in. An enlightened 20th century finally brought reforms and amends; although post-World War II Pacific nuclear testing ushered in lingering radio-active dangers, and Pacific decolonization is still not at an end for a few who would choose independence if given the choice.

AFTERMATH AND PERSPECTIVE

Since World War II, some Oceanic territories have achieved self-government--Fiji, Papua New Guinea, Western Samoa. Nine new South Pacific republics have established their existence since 1962, including Vanuatu (formerly known as the New Hebrides) and Kiribati (pronounced Kiribahss). Other places have long since become an integral part of America (Hawaii, American Samoa) or France (French Polynesia); or they enjoy considerable benefit as wards of enlightened U.S. or British or New Zealand trusteeship. In the 20th century of jet travel, Oceania has become an instantaneous part of the troubled globe; it can neither escape global concerns nor simply retreat into a traditional way of life which--however culturally desirable--must still come to terms with inevitable change.

Withal, the Pacific picture looks bright: growing industry and tourism (when not disruptive) together with unparalleled educational and health facilities, all contribute to a greater well-being than many islanders ever before enjoyed. As for their loss of innocence (bewailed by more than one cultural anthropologist), it must be accepted as unavoidable.

(Prepared by Waldemar Hansen)



The Classic Shells of the World by T. C. Lan. 1993. privately published by the author, P. O. Box 34-35, Taipei, Taiwan. 224 pp., 196 color plates. $195.00, including registered air-surface mail.

This magnificent volume is without question one of the most beautiful books ever published on the mollusk shell. The author, for many years a leading figure in malacology in Taiwan, has described several new species and in 1979 published the very fine *Rare Shells of Taiwan in color*. With his new book he has shared with us his love of the spectacular beauty of nature as exhibited in the shells created by the animals of the phylum Mollusca.

In the nearly 200 color plates, the author has given us a visual delight - unrivalled beauty of color and form - with his selection of 225 mollusk species, primarily gastropods and bivalves. Often several examples of a species have been presented, giving us a glimpse of variation within a species. Collectors' favorites - Cypraeidae, Muricidae, Volutidae, Conidae, Pectinidae, and Spondylidae - are well represented; the other half of the plates feature exceptionally attractive specimens of common to rare species. Among the highlights are the exquisite *Rotaovula hirohitoi* Cate & Azuma, 1973; the unbelievably elegant *Babelomurex (Tarantellaxis) kuroharai* (Habe, 1970); several colors of *Spondylus linguafelis* Sowerby, 1847; *Phyllonotus eversoni* D'Attilio, Myers & Shasky, 1987; *Kapala kengrahami* Ponder, 1982; *Columbarium brayi* Clench, 1959; *Trigonostoma milleri* Burch, 1949 - I could go on and on and on!!!

The specimens are frequently pictured with a carefully selected natural object - to this reviewer a most effective method of focusing the attention of the viewer on the attributes of the chosen specimens. The quality of the photographs are without equal - each plate stunning and worthy of framing as a gift for the most fastidious collector. The plates are followed by ten pages of explanation, in which the name, size, locality and, quite often, interesting facts, are given for each species. This reviewer noticed two misspellings (both in common misuse) - *Conus incostans* should be *inconstans* and *Spondylus linguaefelis* should be spelled *linguafelis*.

Only 1000 copies were printed - I have a letter stating that the printing plates were then destroyed. This is a book that, despite the relatively high cost, any shell collector would enjoy, and not merely as a "coffee table book". If you want to give yourself a present that you will alsways be proud to own, this is that special item. Do not procrastinate - get your copy before this limited, numbered edition is out of print. You will be glad that you invested in such a remarkably excellent volume.

Walter Sage, 11 April 1994

EDITORIAL STATEMENT - One of the things I have enjoyed over the years is the purchase of new books on mollusks and writing reviews for shell publications. I still buy the books (you should watch me when a book list comes out or see me at the AMU, COA or WSM meetings) but I have no time at present to write the reviews. So I would welcome assistance from any NYSC member who would care to take on this job - I can help you select books, and give you copies of reviews I and others have done. Toward the end of 1993 there were several new books available that I have not gotten to reviewing yet, and now as Fall 1994 sets in, there are quite a few more books that have just become available. It is not a difficult matter to write a book review - one needs only give basic publication facts such as the number of pages and illustrations, what the book is about, whether it is a useful book for the collector, and any personal comments. New book lists have been recently received from Mal de Mer Enterprises and from Richard E. Petit. Both include many books that collectors should have and be familiar with - let's find a club member willing to explore these books and share their findings with us.

THE HISTORY OF SHELL COLLECTING

by Eli Horowitz

Serious shell collecting - apart from utilitarian usage - has a longer history than most of us realize. At Pompei, various Red Sea shells were found, which were obviously imported and may have been part of some ancient Roman collection. During the Middle Ages, the various princely courts were repositories of natural history objects. But with the discovery of America, new worlds were opened.

The Dutch, especially, had a vast commercial empire, and began to collect shells on a serious scale. The Dutchman Rumphius, who was based in Amboina (Indonesia) wrote a book on shells in the early 17th century. At the same time, the Englishman Lister was publishing books on natural history, especially seashells. Artists often illustrated seashells in beautiful, handpainted colors, but printers would sometimes reverse the pictures, making a normally dextral shell appear sinistral.

Linnaeus used his personal collection in his classification system published in 1758 in the 10th edition of his "Systema Naturae". Those rarities of yesteryear have declined in monetary value, but the collections made by Linnaeus, Gmelin, Roeding and others are scientifically priceless because of the original (type) specimens in these collections.

Many shells commonly available today - epitonids, cowries, cones, volutes - in the early days of shell collecting were prized beyond compare because they were so seldom on the market. It was a mark of culture to have a collection of sea and land shells and other natural history objects. Explorations such as those undertaken by Captain Cook in Australia and the South Seas added many new shells to published lists and to collections - among them Cypraea aurantium and Astraea heliotropium. Collecting shells led to describing and classifying and the great works of the late 18th century ushered in the golden age of collecting and classifying - the 19th century.

Hugh Cuming, a supposedly illiterate sailmaker, journeyed from England to South America, where he made his fortune, and lived the rest of his life enjoying the pursuit of seashells. Cuming traveled extensively and brought many new species back to England, where these were named by Reeve, D'Orbigny, and the Sowerbys, to name but a few of the illustrious describers of the early 19th century. The three generations of Sowerbys continued into the early 20th century, until the World Wars slowed the collecting and naming of shells.

Today we are living in a fortunate age of scuba diving, deep-sea trawling, and tangle-netting, all which have contributed much to the hobby of collecting as many shells never available in numbers came on the market. To complement the shells easily purchasable, there are many good shell books. Prices of shells have gone down, while the good books have risen in price. A collection of shells is relatively easy - one need have only the necessary funds - Hugh Cuming would be amazed were he around today to see the wonderful shells we can possess.

The 1995 Shell Desk Diary is now published by RobAllen Press of Houston, Texas. This 35th annual edition begins an adventurous new series of yearly diaries that will feature the sights and history of the globe's most picturesque locales and its brilliant seashell and marine life. The Diary's most attractive feature, that distinguishes it from other desk calendars, is its 32 pages of full color photographs featuring the world's most decorative seashell and marine life set upon a background of breathtaking seascapes and tropical destinations. The 1995 Diary will highlight the rich history and landmarks of England.

To order your copy, send $9.75 plus $0.95 for shipping and handling to The Shell Desk Diary, P. O. Box 2663, Houston, TX 77252-2663. Order as soon as possible, to assure delivery in November. Many collectors also collect the Shell Desk Diary, so let's be sure to get orders in now and not miss out on a collector's item.

CONCHOLOGISTS OF AMERICA, INC.
A Collective Devotion To Advancing- Conchology.

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1994 SUMMER & FALL SHELL SHOWS AND MEETINGS

Jul. 9-14 **American Malacological Union Annual Meeting**
Houston, Texas
Constance E. Boone, President
Malacology, Houston Mus. of Nat. History
1 Hermann Circle Drive
Houston, TX 77030 (713) 639-4677

Jul. 16-17 **Keppel Bay Shell Show**
Yeppoon, Queensland, Australia
Jean M. Offord, 277 McDougall St.,
N. Rockhampton, Qld. 4701, Australia (79) 283-509

Jul. 18-23 **Conchologists of America Convention**
Corpus Christi, Texas
Jean Roe, COA Convention '94
P.O. Box 45
Portland, TX 78374 (512) 643-2056

Jul. 30-31 **Townsville Shell Show**
Townsville, Queensland, Australia
Glenda Rowse, 19 Farrell Street
Kirwan 4814, Queensland, Australia (77) 732-718

Aug. 5 - 7 **Jacksonville Shell Show**
Jacksonville Beach, Florida
Elizabeth Hunter, 6362 David Drive
Jacksonville, FL 32210 (904) 786-6845

Aug. 13-14 **Cairns Shell Show**
Cairns, Qld., Australia
Babara Collins, House of Ten Thousand Shells
32-34 Abbott St., Cairns 4870
Queensland, Australia (70) 51-3638

Aug. 18-20 **Jersey Cape Shell Show**
Stone Harbor, New Jersey
Jersey Cape Shell Club, P.O. Box 124
Stone Harbor, NJ 08247 (609) 653-8017

Aug. 20-21 **Panama City Shell Show**
Panama City, Florida
Jim & Linda Brunner, P.O. Box 8188
Southport, FL 32409 (904) 265-5557

Sept. 17-18 **Central Florida Shell Show**
Orlando, Florida
Larry Stiles, 1505 N. Carolwood Blvd.
Fern Park, FL 32730 (407) 834-2176

Sept. 17-18 **International Shells & Fossils Bourse**
Ottmarsheim, France
Michel Rioual, 2 Rue des Vergers
68490 Ottmarsheim, France 89-26-16-43

Oct. 14-16 **Annual German Shell Fair**
Hamburg, Germany
Klaus Passan, Friedrichsberger Str. 63
22081 Hamburg, Germany (40) 294-669

Oct. 29 **British Shell Collectors' Club Shell Show**
London, England
Kevin Brown, 12 Grainger Road
Isleworth, Middlesex TW7 6PQ, England (81) 568-8333

Nov. 5 - 6 **Philadelphia Shell Show**
Philadelphia, Pennsylvania
Al Schilling, 419 Linden Ave., (215) 886-5807
Glenside, PA 19038

Nov. 18-20 **North Carolina Shell Show**
Wilmington, North Carolina
John Timmerman, 32 Jeb Stuart Drive
Wilmington, NC 28412-1700 (919) 452-0943

We have advance word that the Sanibel Shell Show will be held March 2-5, 1995. Data on the Winter/Spring Shell Show schedule will be printed in the December issue of the NOTES. If you have attended one of these shows and would like to share your thoughts with us, we would greatly appreciate receiving a report. Wethank Donald Dan for providing this information to shell clubs.

SH-DATE2.94 (WP5.1)
April 15, 1994

DONALD DAN
2620 Lou Anne Court
W. Friendship, MD 21794, U.S.A.
Tel. (410) 442-1242 or 442-1942

THE MANY USES OF SHELLS

by Sam D. Freed

Man is not the only one who makes use of shells. The hermit crab picks up a discarded shell and crawls into it for protection. As the crab grows, it will find other shells to replace the now too small home and continue to cover its body.

Mollusks have been man's food and tools since prehistoric times. Ancient kitchen middens tell us the story of man's development. Before the dawn of history, for more than 6000 years, man has relied on mollusks for food. The middens (or man's garbage heaps) tell an interesting story. The meat of the mollusk could be eaten raw - no cooking was needed. Early man did not have to worry about pollution, so he left huge piles of discarded shells that even now can occasionally be seen along the coasts. And as man developed, he found many uses for shells.

The ancient cities of Tyre and Sidon along the Mediterranean coast were well known for their production of the purple dye extracted from murex shells. This dye, known as Royal Purple, was more valuable than gold. Cloth dyed with this color was worn only by nobility. The ancient Hebrews made use of the blue dye from Janthina snails which were washed up on the shores of Israel. Threads of blue were woven into their prayer shawls and had a strong religious significance. (Numbers 15:38) states, "and they shall put upon the fringe of the corner a thread of blue". This is a reminder tha you should look upon it and remember all the commandments of the Lord.

A story is told of a visitor to the seashoew who was unfamiliar with the dye of Janthina shells. He stuffed the pockets of his white jacket with the shells, and when he returned to his hotel, the jacket was no longer white. The dye from these mollusks had dyed it a spotty blue.

The shells found in the ancient graves of Egypt (see NYSC NOTES No. 321, December, 1991) tell us many interesting stories about jewelry made from shells. The tools used were made from flint and copper. Beautiful necklaces, bracelets, earrings and pendants were made using these simple tools. The worldly possessions of the Egyptians were buried with them in the expectation that these would continue to furnish pleasure in the after life.

Cowrie shells were used as a medium of exchange by many peoples in many areas of the world. On our west coast, tusk shells were used for this prupose, while on our east coast the hard shell clam Mercenaria was cut into small cylinders, bored with holes and strungs as beads. This wampum was used for trade for many years. Cowrie shells were shipped from the Maldive Islands to Africa where they were used for a number of purposes, including barter, decoration, and ritual.

Triton and conch shells were made into trumpets by cutting off the tip of the spire. In Japan the triton was used by priests to call people to worship. Conch shells were blown to announce the arrival of a fishing vessel in the West Indies.

Bailer shells were used as containers or as dippers for drinking or emptying water out of vessels. Pointed shells found use in agriculture as digging tools. In more recent times shells have been ground up for use as a supplement for chicken feed. The calcium supplements you purchase in drug stores is from oyster shells. Calcium from oyster shells helped egg production in chickens and to strengthen bones in humans. Shells have frequently been broken up and used in Florida for highway construction. An example is the use of shells from scallop dumps for road fill.

In art Boticelli made the scallop shell famous in his painting of Venus. Pecten maximus became a badge during the Middle Ages to show that one had visietd the shrine of St. James in Spain. The crusaders to the holy land in Jerusalem wore the scallop Pecten jacobeus. The giant clam Tridacna gigas was used a baptismal font. Left-handed shells of the chank are considered sacred in India.

My daughter who travels extensively sometimes surprises me with a beautiful carved shell. Some years ago she brought back from Venice, Italy a helmet shell that had a Greek mythological scene carved into it. The shell was mounted on a tripod stand with beautiful molded green legs having the shape of dolphins. Another time I was surprised with a carved tiger cowrie showing deer in a woodland scene. I also was given an olive shell with a carved peacock. Years ago when I smoked, I was given an ash tray in the shape of a fish. It was made from a river clam with both sides showing mother-of-pearl. I was given a wooden jewel box inlaid with small pieces of mother-of-pearl. I once acquired a clear, heavy plastic paperweight. Inside the plastic can be seen a tiny sea horse on sea weed and many tiny shells.

One of my sisters surprised me one year by giving me a freshwater shell, with the pearly side painted with a tropical scene and inscribed "Merry Xmas 1882". Some time ago I visietd a shelling friend who used a queen conch as a door stop. The path to his house was bordered with surf clam shells. A room of his house was set aside just for shells - a true "sheller's paradise". Shells from all over the world were neatly displayed in lighted cabinets.

Throughout my 50+ years of working with shells - marine, land and freshwater - I have derived much pleasure from and am thankful for this hobby. In my retirement years I have kept busy working with my worldwide shell collection and giving talks to school children. I encourage you to learn more about shells and share what you know with others. In this way we can continue to spread interest in shells.

State Fossils in the U. S. by Tony Verdi

from AMERICAN PALEONTOLOGIST (newsletter of Paleontological Research Institution, Ithaca, New York - Volume 2, Number 2, May 1994)

A state symbol is meant to represent something important, colorful, or typical, that presumably draws attention to a state. All states have birds, trees, and flowers that have been designated as state symbols. Some states have expanded their state symbols to include state animal, fish, fruit, dance, sand, and even beverage. (also shells!)

In a number of cases, for example, a state has named a fossil as its state rock, gem or stone: Florida's "state rock" is agatized coral and Texas' is petrified palmwood; Michigan's "state stone in Petoskey stone (Hexagonaria percarinata, a rugose coral); Mississippi's "state rock" and Washington's "state gem" is petrified wood; Hawaii's "state gem" is black coral, fossil or Recent, and West Virginia's is Lithostrotionella, a rugose coral.

Thirty states, however, have officially designated "state fossils", and one state has an unofficial state fossil. These states have their state fossils because rock clubs and other citizen groups persuaded the state governments to act. The following is a listing of the "enlightened" states and their state fossils:

Alabama - Basilosaurus cetoides (whale, Eocene); Alaska - Mammuthus primigenius (mammoth, Pleistocene); Arizona - Araucarioxylon arizonicum (wood, Triassic); California - Smilodon californicus (saber cat, Pleistocene); Colorado - Stegosaurus sp. (dinosaur, Jurassic); Florida - Eupatagus antillarum (sea urchin, Eocene); Georgia - shark's tooth (no species specified); Idaho - Equus simplicidens (horse, Pleistocene); Indiana - crinoid (in legislative review); Illinois - Tulimonstrum gregarium (tullymonster; Carboniferus); Kentucky - brachiopod (no species or age specified); Louisiana - petrified palm wood; Maine - Pertica quadrifaria (plant, Devonian); Maryland - Ecphora quadricostata (snail, Miocene); Massachusetts - dinosaur track (no species specified); Mississippi - Zygorhiza kochii (whale, Eocene); Missouri - crinoid (no species specified); Montana - Maiasaura peeblesorum (dinosaur, Jurassic); Nebraska - Archidiskodon mammuthus (elephant, Pleistocene); Nevada - icthyosaur (no species specified); New Jersey - Hadrosaurus foulkii (dinosaur -

Cretaceous); New Mexico - Coelophysis sp. (dinosaur, Triassic); New York - Eurypterus remipes - (eurypterid, Silurian); North Dakota - Teredo-infested wood (Paleocene); Ohio - Isotelus maximus (trilobite, Ordovician); Pennsylvania - Phacops rana (trilobite, Devonian); South Dakota - Triceratops porosus (dinosaur, Cretaceous); Utah - Allosaurus fragilis (dinosaur, Jurassic); Virginia - Chesapecten jeffersonius (clam, Pliocene); Wisconsin - Calymene calebra (trilobite, Silurian); Wyoming - Knightia sp. (fish, Eocene).

IN MEMORIAM - Anne Taxson, Rose D'Attilio, Mary Kline

Word was received that long time NYSC member Anne Taxson passed away from cancer on February 5, 1993. She and husband Al, who died in January, 1989, had joined NYSC in 1958 and were members for 26 years. They had moved to Florida some years ago and had shared their collection with the American Museum and NYSC.

Veteran NYSC members know Tony and Rose D'Attilio, members of NYSC for may years. Formerly of Valley Stream, NY, they had moved many years ago to San Diego, CA and Tony was active in the study of mollusks, working at the San Diegi Natural History Museum and publishing many papers on species of the family Muricidae. Rose worked part time for Don Pisor, the San Diego Shell dealer. She had suffered a stroke in late 1993 and died from another massive stroke on April 22, 1994. We understand that Tony, who was 85 years old earlier this year, will be staying with family. We extend sincere sympathy to Tony and his family.

On May 1, 1994, the late George F. Kiline, an outstanding scientific collector of mollusks for Harvard and the Academy of Natural Sciences, fulfilled a 24-year old promise he had made his equally accomplished wife, Mary Clasp Kline. He had vowed to inform her of the collecting conditions on the other side of the River Styx.

"Mary, I have good news and bad," he whispered.

"George, you know I always wanted the good news first," she replied.

"Well, Mary, the collecting is fantastic! I've found at least 30 new species of Strombus and Cypraea, and the marginellas are bigger than grapefruit!"

"And the bad news?" "You're to lead the field trip tomorrow," added George.

"George," she laughed, " if you're there to hold my hand as we cross those coral boulders, I'll be more than ready."

On May 2, 1994, at the age of 83, from her apartment overlooking Diamond Head in Hawaii, Mary joined George and that growing band of shell collectors who now no longer worry about pollution and myriads of conservation restrictions.

Mary and George began collecting under the tutelage of Professor "Bill" Clench at Harvard who had just launched the mollusk journal, Johnsonia. The Klines spent many of their vacations gathering photographs, notesand specimens, including Strombus klineorum Abbott from Sri Lanka, for scientists contributing to Johnsonia and Indo-Pacific Mollusca.

They joined at their own expense several expeditions sponsored by Ostheimer's Natural History Foundation and the Academy of Natutal Sciences to Palau (1955), New Caledonia (1959 and 1961) and the Sulu Sea, Philippines (1968).

The Klines joined the New York Shell Club in 1964 and were members until 1969, when they moved to Hawaii. George died in 1972, but Mary continued her mollusk activities independently for many years. Their main collection was donated in 1972 to the Delaware Museum of Natural History, and her extensive collection of color slides to the Bailey-Matthews Shell Museum on Sanibel Island.

(R. Tucker Abbott - May 1994)

Congratulations and best wishes to Paula Mikkelsen, who will take the position of Assistant Curator of Mollusks at the Delaware Museum of Natural History in October.

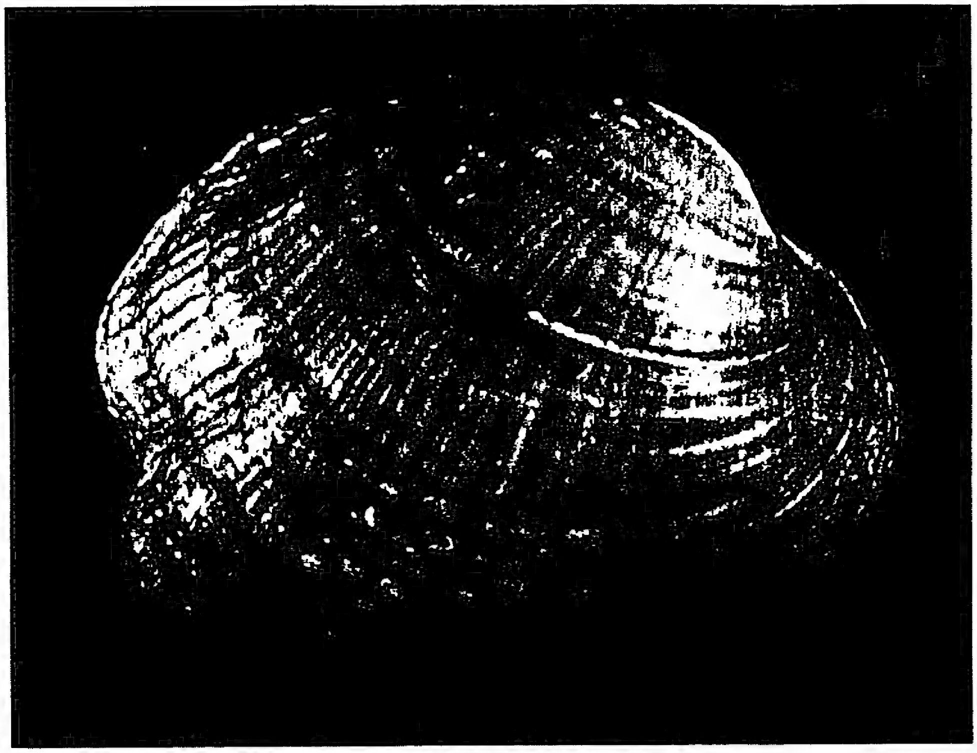


Figure 1. ***Epioblasma obliquata perobliqua*** **(Conrad, 1836). St. Joseph River, IN (OSUM)(FE), 32 mm. OSUM = Ohio State University Museum of Zoology. FE = Federally endangered.**

NORTH AMERICAN FRESHWATER MUSSELS

PART I. THE QUICK AND THE DEAD

by Thomas D. Watters

In 1987, in a tiny creek in northwestern Ohio, I found a live *Epioblasma obliquata perobliqua* (Fig. 1). In fact, I had been contracted to find it. In a thorough survey of this creek and adjacent ones over several months, I found only the one. When I returned it, I knew that I had just seen one of the rarest animals on Earth. I also knew that I may be the last person ever to see this species alive again. Once widely distributed in the Wabash and Maumee River systems, it now occurred in less than ten miles of this creek, and nowhere else on earth. What had happened to this mussel? How had it come to the brink of extinction?

That species is one of many that face almost certain extinction in the very near future. Although 51 freshwater mussel taxa are now federally endangered, many more are even rarer. But most people are unaware that they even exist. After all, they're not majestic like California condors, or awe-inspiring like blue whales, or warm and fuzzy like pandas. They are every bit as much a species as those celebrated distant cousins, and have the same right (if such a thing exists) to survive. But within the past 200 years, dozens of native freshwater mussels have become extinct, and others are certain to follow. Every one of them may have been driven to this point of no return by the actions of man.

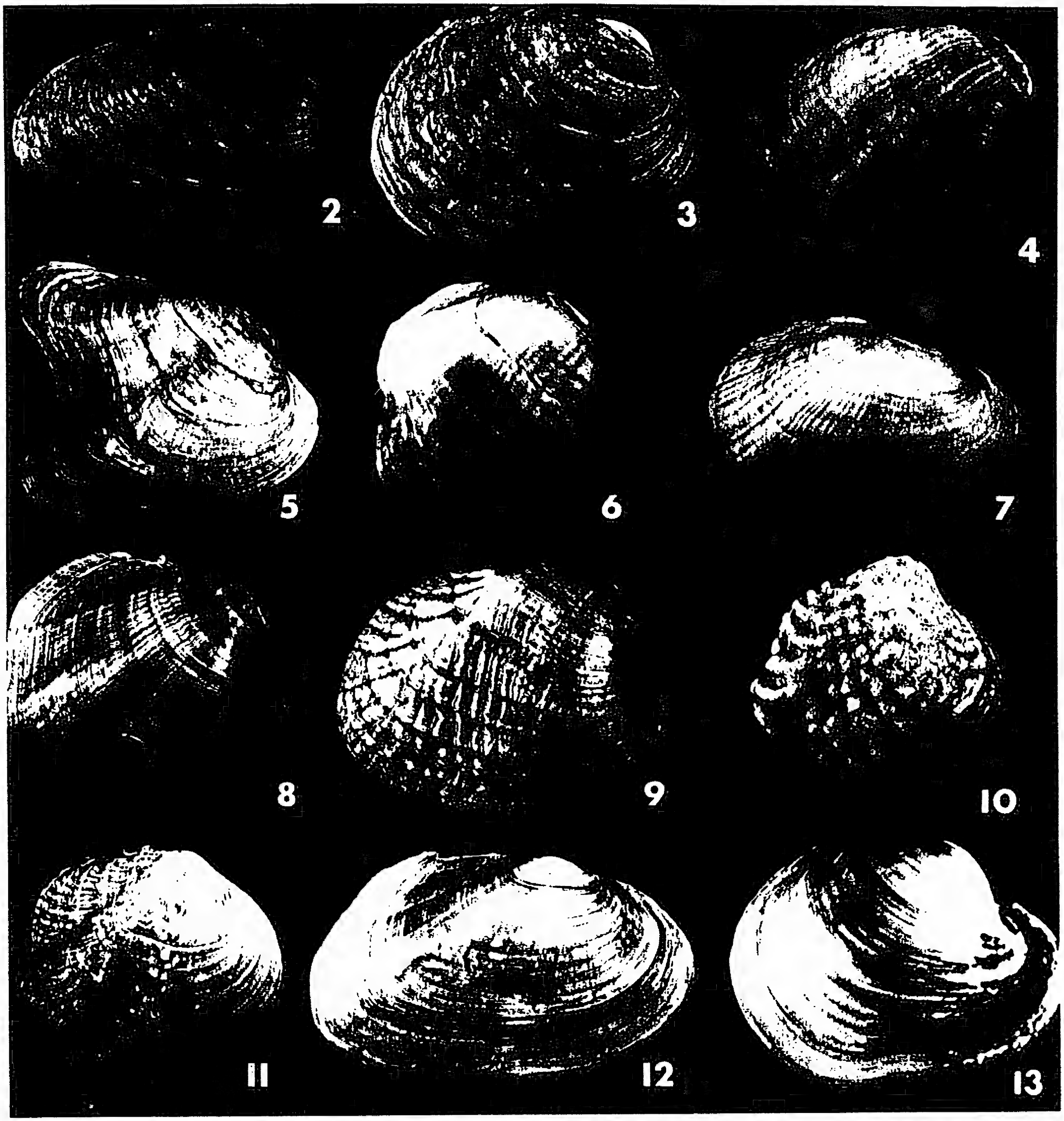
In order to appreciate how man has affected mussels, we need to know a little of their basic biology and history. Freshwater mussels belong to the order Unionoidea, and in North America they are represented by two families. The Margaritiferidae are few in species number, with only five taxa in North America. The other family, the Unionidae, has perhaps 300 species. Throughout this series I will refer to our freshwater mussels as unionids, although they also have been called clams, mussels, and naiades. They are neither clams nor mussels, but those appellations are so entrenched in our vernacular that it is useless to try to suppress them. They are believed to be descendants of the once diverse marine Trigoniacea, today represented only by *Neotrigonia*. They have been here at least since the Triassic, and no place on earth has as many species as North America.

Living in rivers is very different from living in the ocean, and not just for physiological reasons. The world of a unionid is a linear one, with a constant current. Droughts and flood are the norm. Temperature is much more variable than in the ocean. In general, it's a rough life. Environmental rigors notwithstanding, one of the greatest problems to unionids is how to distribute their offspring, within and between rivers. The next river may be only a mile away, but the intervening dry land is insurmountable for a unionid to cross.

Unionids, like all bivalves, do not copulate. The male liberates his gametes into the water and "hopes" they find a female. But because rivers have currents, and sperm cannot possibly swim upstream against them, that female must be downstream. When she releases juveniles, they too will be carried downstream. Eventually, most rivers reach the sea, and that would be the end of these freshwater mussels. But we have unionids distributed in rivers and creeks across much of North America. Why are they still here?

continued on page 6

Division of Wildlife, Ohio Department of Natural Resources, Fountain Square, Columbus OH 43224 and Aquatic Ecology Laboratory, Ohio State University, 1314 Kinnear Rd., Columbus OH 43212



A few of North America's rare and endangered freshwater mussels. Figure 2. *Pleurobema clava* (Lamarck, 1819), East Fork, West Branch, St. Joseph River, OH (GTW)(FE), 86mm. Figure 3. *Epioblasma torulosa rangiana* (Lea, 1829), Big Darby Creek, OH (GTW)(FE), 83mm. Figure 4. *Epioblasma propinqua* (Lea, 1857), Tennessee River, AL (OSUM)(EXTINCT), 48mm. Figure 5. *Epioblasma flexuosa* (Rafinesque, 1820), Wabash River, IN or IL (OSUM)(EXTINCT), 83mm. Figure 6. *Epioblasma stewardsoni* (Lea, 1852), Tennessee River, AL (OSUM)(EXTINCT), 36mm. Figure 7. *Epioblasma lenior* (Lea, 1843), Stones River, TN (OSUM)(EXTINCT), 27mm. Figure 8. *Epioblasma personata* (Say, 1829), Ohio River, state unknown (OSUM)(EXTINCT), 47mm. Figure 9. *Lemiox rimosus* (Rafinesque, 1831), Duck River, TN (GTW)(FE), 56mm. Figure 10. *Quadrula stapes* (Lea, 1831), Tombigbee River, AL (OSUM)(FE), 42mm. Figure 11. *Quadrula sparsa* (Lea, 1841), Powell River, TN (OSUM)(FE), 58mm. Figure 12. *Lasmigona decorata* (Lea, 1852), Stewarts Pond, NC (OSUM)(FE), 76mm. Figure 13. *Potamilus capax* (Green, 1832), St Francis River Cutoff, AR (GTW)(FE), 108mm. GTW — collection of the author.

NORTH AMERICAN FRESHWATER MUSSELS, cont'd

During the evolution of unionids, they "happened" on the solution. They have a unique larva called a glochidium (pl. glochidia) that is able to parasitize fishes, and in some species, amphibians. The fertilized eggs are moved to specialized portions of the female's gills called marsupia. Here they develop into glochidia. When they are mature they are released into the water. A few of these come into contact with a fish, the host, and encyst on the gills, fins, or skin. Here they live off the host's tissue, as well as their own, and eventually metamorphose, encyst, and drop off the fish. Recent studies have placed the odds of a glochidium completing this cycle at 4 in 100,000. This is an obligate part of their life cycle — they cannot bypass it if the host is absent. The important point is that while they are on the fish, they are being taken wherever their host is going — upstream, downstream, into tributaries, maybe even into whole other rivers during floods. Thus the unionids have hitched their wagon to a horse in the form of a host. But it is apparent that not just any fish will do. Certain species of mussels can only parasitize certain types of fishes. If they attach to an unsuitable host, the fish's immunological defenses kill the glochidium. This has important implications.

If one wishes to save or manage a unionid species, it is not enough just to make sure that water and substrate quality are sufficient for the mussel to live. You must also save or manage the host, which complicates the problem greatly. Unfortunately, for most species, we just do not know the host's identity. This is particularly true of endangered species. If the host is absent, even the healthiest unionid population will never be able to reproduce, and the individuals will just grow old and die without offspring. We suspect that this is happening to several species right now. In many cases, man has altered the lakes and rivers to such an extent that the composition of fishes has changed, and the proper hosts are no longer present. The host itself may have been driven to extirpation or extinction. In any case, the unionids' novel "solution" to their problem of distribution may have become part of their downfall.

Man has also modified the habitats of unionids in many ways. Like most bivalves, unionids feed by straining microscopic material out of the water with their gills. Although unionids can tolerate natural levels of sediment or silt in the water, man releases much more than what these animals can survive. If the silt does not suffocate them outright, the high levels may interfere with respiration and cause the death of glochidia in the marsupia. Such silt enters the water from agricultural and construction runoff. In addition to silt, agricultural runoff often contains pesticides, herbicides, and fertilizers that stress or kill unionids. Figures 2 and 3 illustrate two species that are now very rare because of these problems. Many states now encourage farmers to maintain a border, called a riparian corridor, along streams to act as a filter, and advocate changing to no-till practices. In areas where mining takes place, coal fines and dirt often wash into the rivers, where they, too, smother the animals. Furthermore, water leaving strip-mined land is often acidic. I have witnessed streams in mining land with a pH of 2 — that of vinegar — far below what any unionid could survive. In many areas sand and gravel are removed from the river for construction. These practices not only kill unionids in the immediate area, but stir up sediments that are carried far downstream. In some places, miles of river bottom literally have been removed, along with the mussels in it.

By far the greatest cause for the demise of mussels is the damming and impoundment of rivers. Many species were adapted to the riffles of large rivers such as the Ohio, Coosa, and Tennessee Rivers. These riffles are long gone, submerged under many feet of water. The silt that was once carried away by the swift currents now rains down on the mussels. Highly oxygenated water becomes anoxic. Bottom temperatures may not rise enough to allow reproduction to occur. Host fishes die, leave, or are prevented from moving by dams. The species illustrated in Figures 4 to 8 were river forms living in shallow riffles and runs. All are believed to be extinct. They were as good as gone the day the dams were completed. The species in figures 9 to 11 are on the brink of extinction for similar reasons. As an example, think of the Falls of the Ohio near Louisville in the early 1800's. Here Rafinesque, the eccentric describer of many North American unionids, had his epiphany. Perhaps as many as 80 unionid species occurred here — more than any other place on Earth. Most people are amazed to find that the average depth of the Ohio River at that time was one foot, and that you could walk across the river on the backs of mussels. But the Falls, and the mussels that lived there, are now buried under many feet of water and silt.

These represent the indirect destruction of mussels by man. Just as we did in the past, we are today still purposefully killing them in incredible numbers. Three episodes stand out: the Pearl Rush, the button industry, and the cultured pearl industry.

The Pearl Rush began in 1857. In that year, in a New Jersey stream, a pearl was found in a mussel that was sold by Tiffany's for $2,500 — a lot of money in 1857. Soon, every man, woman, and child was shucking every mussel to be found in search of easy riches. Entire streams were depleted of mussels. Despite warnings from the U.S. Fish Commission of severe overharvesting, no effort was made to halt their collection. We have no idea how many millions of mussels were killed, but by the time the frenzy died down at the turn of the century, the craze had spread from New Jersey to the Rocky Mountains. Sharply falling prices as the result of a glutted market eventually halted the Pearl Rush.

Already severely depleted, the mussel beds of North America were hit again. In 1891 the German immigrant John Boepple founded a factory in Muscatine, Iowa that made mother-of-pearl buttons from freshwater mussels. The success of the business inspired others to follow suit, and button factories sprang up across the nation. By 1916, the $12,500,000 industry employed 20,000 people. The unregulated harvest was astonishing. As much as 1,800 lbs of living mussels were removed from some rivers per day. In the Mississippi River, 750,000 lbs were removed in six years. Slow growing, with little recruitment, the mussels could not keep up. At these rates, mussels are not a renewable resource. However, the invention of the plastic button made this industry obsolete by the end of the 1940's. For a time the mussels were left alone. But it was not to last.

In the past two decades, mussels have again become the target of commercial collecting and overexploitation throughout much of the United States. Tons of mussels are harvested for making pearl beads or nuclei. These are shipped overseas and used to seed marine pearl oysters, which form gem-grade pearls from the beads. These cultured pearls are then harvested and sold throughout the world. Most of the cultured pearl you buy is actually a mussel bead from right here in North America, with only a thin veneer of marine pearl nacre over it. The main source of beads for this multi-million dollar industry is mussels from the Tennessee, Wabash, Cumberland, Mississippi, and other rivers. These are collected by much more efficient means than the methods of the early 1900's, and beds are quickly and easily overharvested. In the Tennessee River alone, in one year, 4,750 tons of mussels were killed. Many states that have allowed commercial harvesting of mussels have had their stocks depleted past the point of profitability to the industry, and harvesters are forced to find other sources for mussels. These include poaching mussels from rivers closed to harvesting. The considerable money that can be made poaching these beds has made this a chronic problem in some states. Ohio, for instance, is closed to commercial collecting, but in the past two years we have seen a dramatic increase in illegal collecting. Poachers with as much as two tons of living mussels have been caught in just one bed. Working under cover of darkness, these criminals slip into and out of a river often unnoticed. Wildlife officers, already undermanned and overworked, simply cannot be everywhere.

As if this was not enough, we now have a new problem. The zebra mussel was found in the Detroit River in 1988, apparently the result of a cargo ship emptying ballast water it had taken on in Europe — along with planktonic zebra mussel larvae. Today they have spread throughout most of the Great Lakes, the Mississippi, Ohio, and Tennessee Rivers, and many other places. Zebra mussels attach to unionids and just about anything else. As many as 10,000 zebra mussels have been found on one unionid. Perched atop the posterior of the unionid shell, they remove food from the water before it can reach the unionid, remove male gametes before they can encounter a female, and result in the beaching of unionids during storms. Most of the unionids in western Lake Erie have been extirpated by these exotics. Largely a lake species, it may not do well in running rivers. It is a sad irony that we have converted these once free-flowing rivers into a series of impounded reaches — perfect for zebra mussels. How much of our already stressed unionid fauna will be eliminated by zebra mussels is unknown, but many experts fear the worst.

Freshwater mussels are one of North America's main claims to fame in terms of natural history. Colleagues in other countries get all misty-eyed when I mention such Hallowed Places as "Cahaba River, Clinch River, Escambia River, Wabash River...." I have a creek just 20 miles away from where I sit that contains more species of mussels than the entire continents of Europe and Australia combined. It is a resource and a heritage that is rapidly slipping away.

Next time: Part II — **Identification, collection, and the art of Zen malacology.**

The author wishes to thank Dr. David Stansbery, Ohio State University Museum of Zoology, Columbus, Ohio, for permission to photograph many of the specimens used in this article.

(reprinted from AMERICAN CONCHOLOGIST 22(2), June 1994)

Down In The Dumps With The JSC

by Bill Frank

Thirteen members of the Jacksonville Shell Club traveled to the Florida Panhandle the weekend of March 18-20, for some intense collecting in the area's scallop dumps. Headquarters for the trip was the Oaks Motel in Panacea which offers cheap and clean accommodations.

Port St. Joe - sittin' n' diggin'.

Some of Jack's "finds."

Continued on page 3.

Ten of the group (Bill & Betsy Lyerly, Betty Hunter, Gertrude Moller, Bill Frank, Selma Thigpen, Jack Gebert from Jacksonville, and Craig & Audrey Thorn and Andy Hutchison of St. Augustine) arrived in Panacea during the morning/early afternoon on Friday. After checking into the hotel, the group caravanned to the well-hidden dump at Carrabelle, some 25 miles distant.

Although not large, the dump at Carrabelle made up for its relatively small size by its immense odor and presence of two billion flies. A couple of hours of digging in the heat and stench was plenty for even this dedicated group - though the collecting was quite profitable and included four species of Murex as well as five Junonias. The stench, flies, and dead/dying trees surrounding the site, will not soon be forgotten.

Having worked up quite an appetite, all agreed to adjourn to Julia Mae's Restaurant, just outside Carrabelle, for a seafood dinner; stinky clothes and all. Understandably, no one ordered the fresh scallops from the menu. The restaurant was not fancy by any means, but the food was great. The only drawback was the establishment's choice of hand soap in the mens room; **Comet Cleanser**. It did do a good job of removing the smell of the scallop dump but something more gentle to the hands would also have been appreciated. Following dinner, the group returned to Panacea for some well deserved rest and relaxation.

The next morning, the aforementioned group was joined by Kay & Michael Noble of Jacksonville and George Hapsis from Tallahassee. Following breakfast at the motel, the group headed west to the dumps at Apalachicola and Port St. Joe.

Following a scenic 45 mile coastal drive, the caravan arrived at Appalachicola, where George guided the group to the dump. And what a dump it was. Imagine your average-sized residential lot stacked 12 feet high with scallops (and oysters) and you have a mental picture of the dump. Despite its size, there was very little odor. Unfortunately, about all there was in the dump was scallops with very few shells of interest to a shell collector.

With Selma and Andy in the lead, the caravan then continued westward to Port St. Joe, some 20 miles further. As the caravan approached Port St. Joe, the pace quickened as anticipation mounted. Soon the clouds of pollution from the paper mill came into sight signaling our arrival. Buckets came out of the cars and the race for shells was on.

The St. Joe dump was quite large. It consisted of a long driveway of spoil as well as piles of scallops to be explored. It appeared that no recent dumping had taken place, despite its close proximity to two processing plants. The odor was negligible.

The long driveway was first explored and several Junonias were found lying on top in plain view as well as many Distorsio and Murex species. Digging into the piles of scallops then began in earnest.

As the day wore on, the heat and sun began to take their toll. Long sleeve shirts, hats, and even beach umbrellas were the order of the day. After more than four hours of non-stop digging, everyone had a sizeable collection of the species represented and about 35 Junonias had been found.

As is often the case, relatively new club members and first time scallop dump collectors, Kay and Michael Noble, had beginners' luck on their side and collected 15 Junonias as well as a number of Cassis. The couple had demonstrated their collecting talent a year earlier during a club field trip to the APAC Fossil Pit in Sarasota.

After packing up their booty, everyone returned to Panacea and eleven of the tired but happy collectors met at Angelo's Restaurant for a delicious seafood dinner. Getting this dinner was somewhat of an accomplishment in itself. It seems that virtually everyone in Northwest Florida eats regularly at Angelo's and the crowd was something to be envied by any restaurant owner.

The next morning, part of the group returned directly home while the remainder did some marine collecting in the Panacea area.

The most unusual find(s) award for the trip, if there was one, would go to Jack Gebert for his Atlantic Yellow Cowrie and his Neapolitan Triton. To the best of my knowledge, only one of each was found during the whole trip. The bad luck award goes to Bill Lyerly, who did not find a single Junonia. Bill appeared to have a mental block, which prevented his recognizing this species. Even when George partially dug one up, Bill couldn't find it despite George pointing it out with his rake. Next time, Bill!

Overall, everyone enjoyed the collecting, scenery, seafood, and comraderie. The club needs to do it again real soon! Special thanks to Selma for locating and scouting the dumps at Carrabelle and Port St. Joe prior to the trip.

The following is a preliminary list of species found on the trip that I personally collected or observed:

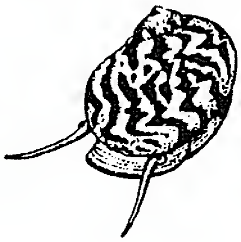
A = Abundant (as many as you wanted)
C = Common (everyone found some)
R = Rare (not found by everyone)
VR = Very Rare (1-2 found during the trip)

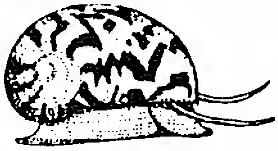
Continued on next page.

Oliva bifasciata bollingi Clench, 1934 (C)
Oliva sayana Ravenel, 1834 (Lettered Olive) (C)
Cancellaria reticulata (L., 1767) (Common Nutmeg) (A)
Distorsio clathrata (Lamarck, 1816) (Atlantic Distorsio) (A)
Tonna galea (L., 1758) (Giant Tun) (VR, fragments)
Phalium granulatum granulatum (Born, 1778) (Scotch Bonnet) (C)
Cassis madgascarensis spinella Clench, 1944 (Clench's Helmet) (R)
Busycon spiratum (Lamarck, 1816) (Pear Whelk) (R)
Busycon contrarium (Conrad, 1840) (Lightning Whelk) (A)
Strombus alatus Gmelin, 1791 (Florida Fighting Conch) (A)
Ficus communis Roeding, 1798 (Common Fig Shell) (R)
Sinum maculatum (Say, 1831) (Spotted Ear Moon) (C)
Fasciolaria lilium hunteria (Perry, 1811) (Banded Tulip) (C)
Fasciolaria tulipa (L., 1758) (True Tulip) (C)
Cypraea spurca acicularis Gmelin, 1791 (Atlantic Yellow Cowrie) (VR-Carrabelle)
Xenophora conchyliophora (Born, 1780) (Atlantic Carrier-shell) (R)
Pleuroploca gigantea (Kiener, 1840) (Florida Horse Conch) (R)
Melongena corona (Gmelin, 1791) (Common Crown Conch) (R)
Architectonica nobilis Roeding, 1798 (American Sundial) (C)
Natica canrena (L., 1758) (Colorfull Atlantic Moon) (R)
Neverita duplicata (Say, 1822) (Shark-eye Moon) (C)
Turbo castanea Gmelin, 1791 (Chestnut Turban) (R)
Conus delessertii Recluz, 1843 (Sozon's Cone) (C)
Conus spurius Gmelin, 1791 (Alphabet Cone) (R)
Scaphella junonia (Lamarck, 1804) (The Junonia) (C)
Cymatium krebsii (Moerch, 1877) (Kreb's Hairy Triton) (VR)
Cymatium parthenopeum (von Salis, 1793) (Neapolitan Triton) (VR-Port St. Joe)
Murex pomum (Gmelin, 1791) (Apple Murex) (A)
Murex fulvescens (Sowerby, 1834) (Giant Atlantic Murex) (C)
Murex dilectus (A. Adams, 1855) (Lace Murex) (C)
Murex cabritii Bernardi, 1859 (Cabrit's Murex) (R)
Murex rubidus F.C. Baker, 1897 (Rose Murex) (R)
Thais haemastoma floridana (Conrad, 1837) (Florida Rock-shell) (R)
Thais rustica (Lamarck, 1822) (Rustic Rock-shell) (R)
Cantharus cancellarius Conrad, 1846 (Cancellate Cantharus) (R)
Aequipecten muscosus (Wood, 1828) (Rough American Scallop) (C)
Lyropecten nodosus (L., 1758) (Lion's Paw) (VR, fragments)
Laevicardium laevigatum (L., 1758) (Common Egg Cockle) (C)
Macrocallista maculata (L., 1758) (Calico Clam) (C)
Chione latilirata (Conrad, 1841) (Imperial Venus) (C)
Arcinella cornuta Conrad, 1866 (Florida Spiny Jewel Box) (C)
Arca zebra (Swainson, 1833) (Atlantic Turkey Wing) (C)

Ever wonder where the scallop boats get their haul? The following is taken from the March issue of the Apalachicola Coast Line newspaper. "The local economy received a much-needed boost when a herd (make that bed) of scallops wandered through the area in January. Usually unpredictable, the succulent, shelled-encased morsels formed a trail some 25 miles long and 100 yards wide in about the same area off St. Joseph Peninsula as three years ago. Knowledgeable locals had predicted the location some six months ago." That would be a prodigious amount of scallops. The catch from this concentration may be what we examined during this trip.

(reprinted from Shell-O-Gram,
Jacksonville Shell Club 35(3),
May-June 1994)





COA CONVENTION REPORT

by Larry Stiles, COA Representative

The Conchologists of America (COA) held their national 1994 convention at Corpus Christi, Texas, during the week of July 17-23.

The convention theme was "The Texas Connection" because members of five Texas shell clubs worked together to organize and run the event, and a marvelous job they did!

The accommodations at the Marriott Bayfront Hotel were excellent - every room had a view of the water. The staff were friendly, helpful, and appreciative.

We were supposed to dress "Western" for the Monday evening welcome party. Well, I bought a bandanna at the Dallas airport, but Texas conventioneers couldn't seem to agree on how it should be worn!

A number of silent auctions were held during the week, during which we noticed many shell labels that sa6id: "taken by natives, traded for clothes." This became a running gag of the convention and it culminated during the regular auction on Wednesday when several donated items appeared with the same label. Dave Green (who ran the auction along with Al Deynzer) finally said, "She's traded so many shells for clothes, she must be down to her underwear by now!" The "donees" (there were two) shall remain nameless to protect their privacy!

Field trips were sponsored to the Texas State Aquarium (Thursday) and the Museum of Science and History (Friday) with a chance on our own to board and tour the aircraft carrier U.S.S. Lexington which began its service in W.W. II. It is now a permanent harbor museum.

Across the street from the Aquarium were berthed the replicas of the Nina, Pinta and Santa Maria.

Tuesday evening a sunset cruise of the Corpus Christi Bay and Harbor allowed us to view Columbus' fleet at close hand.

So many interesting talks were given during the convention that I hesitate to mention one or two, thus slighting others. I'll only say that there were many slides of great locales, live animals, and colorful and interesting specimens.

The Convention auction raised a whopping $14,726 dollars, thus enabling the COA to increase its educational grants for 1995. Thanks to all who gave so generously.

Official festivities ended with the Friday night barbecue banquet with Dr. Henry Chaney of the Santa Barbara (Calif.) Museum of National History exploring the molluscan system of the Pacific Islands of Clipperton, Clarion and Cacas.

The reins of power were passed from outgoing President Doris Underwood to our own club member and new COA President, Linda Koestel (pronounced "Kess'tel)!. A congratulatory bouquet of spring flowers was presented to Linda on behalf of the COA and the Central Florida Shell Club by Alan Gettleman and Larry Stiles.

Some members stayed over Saturday to take one last field trip to the Padre Island National Seashore. One of the two busses broke down, so members of the Coastal Bend Shell Club scrambled to their cars to ferry the extra trippers to the island. Box lunches and drinks were provided.

A warm, appreciative "Thank You" to Jean and Charlie Roe, Ellen and Ted Strasser, Dave and Lucille Green, Theresa Stelzig and the entire "Texas Connection" for a wonderful convention that provided many memories!

(reprinted from Central Florida Shell News 15(3), August 1994)

Plan now to attend the 1995 COA June convention in San Diego, California.

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FOUNDED JAN. 1949

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NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

1994 - 1995

PLEASE NOTE: There may be differences in the dates and/or places for meetings from those given below. Consult the current issue of N.Y.S.C. NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

September 11, 1994
October 9, 1994
November 13, 1994
December 11, 1994
January 8, 1995
February 12, 1995
March 12, 1995
April 9, 1995
May 14, 1995
June 11, 1995

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, starting at 2 P.M. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying a fee by presenting your New York Shell Club membership card.

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September to June, room 319 of the American Museum on Natural History, New York City (unless otherwise advised). Present NYSC membership card for admission on meeting dates.

PROGRAM SCHEDULE

SUNDAY, September 11, 1994 at 2:00 p.m. - Gertrude Moller, a founding member of the Jacksonville, FL Shell Club will present slides entitled "Solomon Islands Shelling" - don't miss it!

SUNDAY, October 9, 1994 at 2:00 p.m. - we are pleased to announce a program by Maxwell (Mickey) Cohen entitled "New York City Coastal Ecosystem - a Close-up View" - sounds interesting.

SUNDAY, November 13, 1994 at 2:00 p.m. - Intrepid NYSC member and diver Carl Ehrlich will share with us "The Diversity of Conus cedonulli".

SUNDAY, December 11, 1994 at 2:00 p.m. - Long Island Shell Club member and veteran lecturer Hank Foglino will present "Sound in the Sea" and "Tides, What Causes Them".

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Al Scarpetti has been in contact with member and former president Fred Cannon, who has again invited us to his home for the January, 1995 meeting. Details on this planned visit to what is assuredly one of the most fabulous homes in Brooklyn are to be announced at a future meeting and will be in the December NYSC NOTES.

Al Scarpetti and Long Island Shell Club President Ken Ehalt are planning a joint field trip to the New York Aquarium at Coney Island for Saturday, November 12. We will hear all the details at our October 9 meeting. Please plan to join us for this special occasion - those who attended the last outing to the aquarium enjoyed it very much and we were treated to an outstanding behind-the-scenes-tour.

The December issue of the NOTES is likely to be "heavy" on meeting highlights and otherwise will focus on North American endangered and threatened species. I have been accumulating material for some time and just need to be able to work it into readable format. Barring further complications, these are the data you will have in December. All members are urged to contribute material to make these NOTES a joint operation, rather than the efforts of just a few. And be thinking about a replacement for me after the June issue - there is no longer enough time for me to devote to the production of the NOTES. It's time for new people to take the reins.

WS

SHELLS ARE WHERE YOU FIND THEM! THIS MONTH - ON WALL STREET!

(Thanks to the many who have seen this fine article and shared it)

'Mr. Seashell' Stands Atop Small World of Malacology Today

R. Tucker Abbott Knows All About Myrid Mollusks; His Sideline is Paper Clips

[by Eric Morgenthaler, Staff Reporter of The Wall Street Journal; reprinted from March 18, 1994 issue]

SANIBEL ISLAND, FLA. - For at least a decade, this newspaper has not used the word *malacology*.

Today, we make up for lost time.

Malacology is the study of mollusks - including snails, scallops, clams and conchs, and their shells. The study of mollusk shells is called conchology, another word seldom seen here. Malacology dates back to 19th century France, conchology to Victorian England.

The best-known malacologist in America is 74-year old R. Tucker Abbott. He has written about 30 books on shells, most of them for a general audience, as well as hundreds of scientific papers. "He has probably done more to popularize the science than anybody else, living or dead," says Henry E. Chaney, curator of mollusks at California's Santa Barbara Museum of Natural History.

But there aren't all that many malacologists, living or dead, probably no more than 50 or so working in the U.S. Some experts say even that estimate is high. However, a lot of scientists from other disciplines study mollusks and shells, too. And there is a legion of amateur shell collectors. All in all, Dr. Abbott leads a rather big field.

"He is sort of Mr. Seashell," says Kenneth J. Boss, professor of biology and curator in malacology at Harvard College's Museum of Comparative Zoology.

Dr. Abbott recently accepted a position as director of a new shell museum that is being built on this barrier island off Florida's west coast. The beaches of Sanibel, and neighboring Captiva Island, have some of the best shelling in the U.S.

"It's a full-time job," Dr. Abbott says of his post. "By that, I mean an 18-hour day. But it's fun. You'll find that people become much busier when they retire."

Aloha, Tucker

The museum isn't due to be finished until later this year, so Dr. Abbott now often works in its "preview center," which has a few exhibits and is open to visitors. He is a friendly man with a casual manner and graying hair, and he often sports a stick-on name tag reading "Tucker." He wears one set of glasses and keeps another tethered around his neck. He is partial to a short-sleeved Hawaiian shirt decorated with brightly colored shells.

The preview center is housed in a few rooms of a former shell shop whose owner, Edith Mugridge, retired in 1992 at the age of 86. She now lives in the back but drops in now and then to check on things. Next-door on one side of the shell center is a restaurant called Cheeburger Cheeburger. Its name pretty much sums up its menu. Next-door on the other side is a Shell service station. "What else?" says Dr. Abbott.

Dr. Abbott's career in malacology is unusual in that it spans both the scientific and the popular sides of shell collecting.

Over the past 50 years or so, he has published extensively in scientific journals, held positions in malacology at three major museums, and hunted marine life on scientific expeditions from Zanzibar to Fiji. For 28 years, he edited The Nautilus, the oldest (105 years) American journal on mollusks.

But he is also known for his popular works on shells. One of his many books, for children, "Quiz Me: Seashells," is in Braille. He adopted two of his books for cassette; one cassette is mainly Dr. Abbott reading the index so his audience can learn how to pronounce the scientific names of shells. *Placopecten magellanicus* and *Argopecten irradians* are both a mouthful. The first is the sea scallop, the second the bay scallop.

His most-popular book, a Golden Nature Guide called "Sea Shells of the World," has been published in seven languages, from Norwegian to Portugese.

Malacologists' Muse

Rudiger Bieler, associate curator and head of the invertebrate division of Chicago's Field Museum, says Dr. Abbott's books were what hooked him on malacology as a boy in Hamburg, Germany. "I think that's true for a lot of folks in my situation," Dr. Bieler says. "I know his books have affected people from Holland to South Africa, which is pretty amazing."

Nonetheless, Dr. Abbott frets that popular knowledge of shells is going to the dogs. "I have found that a very large percentage of schoolteachers don't know that shells come from living creatures," he says.

Where do they think they come from?

"Oh, God put them on the beach at 8:00 a.m., don't you know?" Dr. Abbott responds.

Actually, mollusks are one of the oldest and most widely distributed animal groups on earth. About 100,000 living species are known, and another 600 or so are scientifically described each year - some newly discovered, others found in museum drawers.

More facts: Squid have beautiful eyes. The edible oyster undergoes an annual sex change - male one year, female the next. The giant *Tridacna* clam can produce pearls the size of golf balls. The largest known mollusk shell, from a creature that lived 400 million years ago, was 15 feet in diameter. The Chinese are believed to have used cowrie shells for money as early as 2,000 B.C.

Which brings us to the Bailey-Matthews Shell Museum, as the facility [in Sanibel] is called. Its main goal is to educate the public - in contrast to most major mollusk collections, which are primarily for researchers. It has about three dozen exhibits planned, of which eight are finished.

Doing Well By Shells

"They are the finest and prettiest and most educational, if I may say so, exhibits on shells ever produced in the U.S.," Dr. Abbott says. "I'm exaggerating, but it is true to a great extent. Most big museums have to have butterflies and elephants and whales on exhibit, and the mollusk exhibits are miserable. We're going to have to be shining in that area."

He adds: "To me, this is sort of the crowning accomplishment of my life."

Dr. Abbott has loved shells since boyhood - "I had a little museum in the basement," he says. He studied them as an undergraduate at Harvard and a graduate student at George Washington University,

which he attended at night while working as a malacologist at the Smithsonian Institution, which has the world's largest shell collection.

In the early 1950's, a publisher asked him to write a seashell guide. The book, "American Seashells," came out in 1954 - and launched his writing career in the popular realm. (In the nonpopular realm, he already had written such works as "Handbook of Medically Important Mollusks of the Orient and Western Pacific."

Mark of an Expert

"You write a book," he says. "By the time you write two or three, everybody thinks you are a guru...."

Eight or so of his books are still in print, some of them published by American Malacologists, Inc., a small publishing concern he owns and runs with his wife, Cecelia. Royalties, he says, have never amounted to more than a few thousand dollars a year.

The books have made him a celebrity of sorts. He says he appeared twice on the the television program "What's My Line?" The first time for shells, which the panel guessed. The second was for his hobby of collecting paper clips, which the panel didn't guess - although, he says, "Dorothy Kilgallen got as far as bottle tops."

Dr. Abbott says he intends to remain active in malacology "as long as my health holds up" - which, to judge from his current energy level, could be a long time. "It's like a physician's or a writer's career, he says of his pursuit. "It never stops."

Shell Museum on Sanibel Receives State Grant

press release, R. T. Abbott

The Secretary of State and Florida's Chief Cultural Officer, Jim Smith, notified the Bailey-Matthews Shell Museum on July 1 that the Cultural Facilities Program has awarded $241,133 towards the construction of the museum building. Private donors on Sanibel and Captiva, as well as numerous shell enthusiasts as far away as Alaska and Hawaii, have already contributed over one million dollars to the museum and its projects.

The new building, designed by architect George Tuttle, Jr. of Captiva Island, is now rising alongside the Sanibel-Captiva Road opposite the Ding Darling Wildlife Sanctuary. George Parker, the building contractor, expects the 25,000 square foot museum to be finished by early 1995. Its cost will be approximately $1,060,000, not including furnishings, landscaping and public exhibits.

Among the many enthusiastic supporting legislators were the honorable Fred R. Dudley, State Senator from District 25, Representative J. Keith Arnold of District 73, and Representative Tim Ireland of District 75, all of Lee County. Other State grants this year included $17.5 million for the new state college near Ft. Myers and $625,279 to Edison Community College.

"This is an encouraging and significant contribution to the educational resources of Lee County," said Dr. R. Tucker Abbott, Director of the Shell Museum. "The mollusks and their seashells are the most numerous of all the sealife in our waters and are a major source of food for fish and aquatic birds. Our research library on mollusks is already the most complete in southwest Florida, and will serve as a supplemental research resource for the new South Florida University and the Sanibel Public Library."

Thirty-five major educational exhibits on worldwide shells will cost about $600,000. To date $145,000 has been raised for exhibit fabrication, and the exhibits funding campaign continues. One of the leading exhibits on the "Gifts from the Seas of Sanibel" has had the approval of, and will be dedicated to, Anne Morrow Lindbergh, author of the perennial favorite book, "Gift from the Sea". The exhibits are being designed by Dr. Abbott, author of many shell books, and fabricated by CM & Associates of Ft. Myers Beach.

"So far, the 10 or 11 completed exhibits far exceed the quality and beauty found in other natural history museums," says Dr. Abbott. "We've a long way to go, but I hope we can raise enough support to put on a good display on opening day."

EDITORIAL - At the time of this writing (late September) we have learned that work proceeds on the building, with the second floor exterior underway. We hope that the museum will be able to open by the March 2 start of the 1995 Sanibel Shell Fair. In addition to the exhibits mentioned above, Dr. Abbott plans to have a "slide bank" of color slide of shells and living animals available for museum members and others to use and purchase. The library will also be available for those coming to Sanibel. Preparation and distribution of the school kits continues, and Junior Conchologists Classes are being planned to introduce youngsters from the ages of 4 through 15 to shells. We encourage all collectors to write to the Bailey-Matthews Shell Museum, P. O. Box 1580, Sanibel, FL 33957-1580 for information on how you can help make this museum dedicated solely to shells fulfill its potential. Remember, contributions are tax-deductible to the full extent of IRS law.

We are pleased to announce that Dr. R. Tucker Abbott, who has done so much for the popularization of shell collecting and the study of mollusks, was unanimously voted an Honorary Life Member of the Conchologists of America at the organization's July meeting in Corpus Christi, Texas. We congratulate Dr. Abbott on this occasion, and can think of no person more deserving of this recognition.

A TRIP TO REMEMBER

Margaret Thorsen

I told you not too long ago that Saturdays aren't fun any more because there are no longer any fossil pits available to us in this area. That is still true, I'm sad to say. Now, however, I've had an experience which prompts me to tell you that those "good old days in the pits" can't compare with a Vokes Fossiling Jaunt. In mid-June, Sue Stephens and Jakie Upshaw and I were lucky enough to go on one of these, and I want to share it with you. I haven't waited this long because it took five months to recover from it – I just haven't had time to do it justice: this was no standard fossiling trip. It was a combination of fossiling, safari, mining expedition, fitness course, and cold-water sitz bath; it also included a non-stop 3-day pitched battle with horse flies. In a way, it reminds me of Bogart and Hepburn in The African Queen except that we didn't empty any gin bottles into the river, and I don't think there were any leeches. But let me start at the beginning.

Two days before our departure, I picked Jakie up at the airport (she had come for the summer). She was unaware that in two days' time she would be driving more than half-way back to Georgia. She hates car trips, but a chance to go fossiling, plus the extra bonus of doing so with Emily and Harold Vokes, made her forget about the ride. Sue had told us to pack old clothes and to bring shoes that laced on and would dry out overnight. We dutifully packed our standard fossiling wardrobe – the grubbies which we wash and save just for fossiling. We left on a Thursday morning in Sue's car and arrived at 5 P.M. at the motel where were were to meet the Vokeses. When we had all unpacked, we used one of the beds as a coffee table and had a very leisurely "happy hour" before going to dinner.

A Vokes tour utilizes all daylight hours; therefore we met for breakfast at 6:30 A.M. and took off in their car immediately after eating. I really have no idea where we went, nor could I ever find the spot again by myself. After going down a highway for about 12 miles, we turned off on a dirt road. I wouldn't want you to assume that I use the word "road" in its usual sense. Without a doubt, it had at some point in time been utilized by 4-wheeled vehicles. How long ago that was is anyone's guess. I forgot to tell you that Emily was driving. I had the distinct impression that we were trying to lose a pursuer. If you are familiar with Sister Stephanie's driving in the Father Dowling TV series, you will understand what I mean. At one point I asked Emily if she knew where she was going. She assured me that she did and that before long she would find the landmark that she had made mental note of when she had been there 10 years ago. At times she left the overgrown remnants of this once-upon-a-time road and took off up a hill or around some trees, and at other times we were back on the road again. Sometimes we seemed to be where we had been before. It was an interesting ride, which we made, by the way, with the car windows open. That is an important point to make because at times as we went up hills and around trees we brushed against wild blackberry bushes, and the berries dropped into the car. In due time, this yummy trip ended because Emily found her landmark and we arrived. I cannot help digressing for a moment here to comment that the next time Emily speaks at COA, I won't just sit spellbound and listen to every word - I shall probably smile and think to myself "Underneath all that knowledge, Emily, you're a hot-rodder at heart."

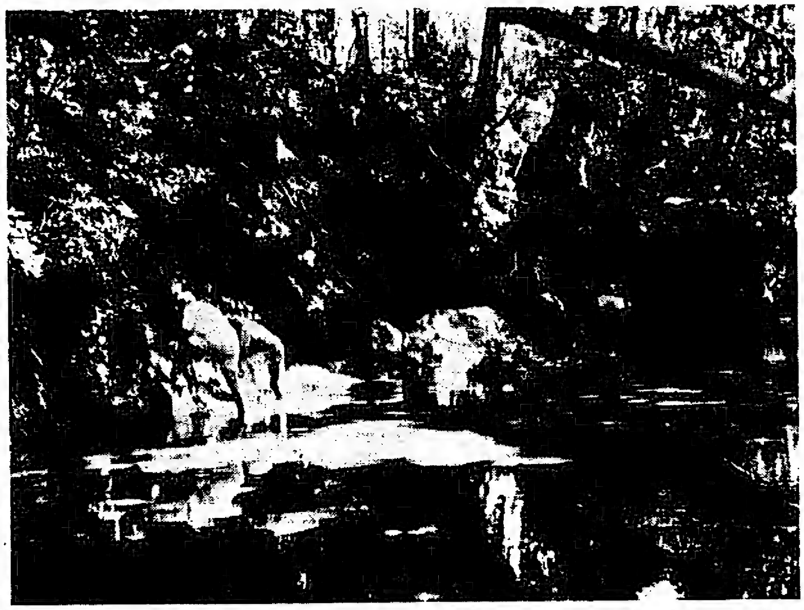
Having arrived in one piece, we unpacked our gear and set off through the trees to a point where we could climb down the bank to the river. Our first step into its strong, cold current numbed our feet, but only temporarily; and despite the blazing heat of the day, the lovely canopy of trees over the water kept us comfortable.

Emily and Harold had very kindly brought a set of 2 collecting boxes for each of us. These are wooden-sided, approximately 20" x 15" x 4" high. One is a trifle smaller and fits inside the larger box. The inner one has a coarse wire mesh bottom, whereas the bottom of the larger, outer box is of fine wire mesh. The object is to nest the boxes, load the inner one with your diggings, and then schush them around in the water. The fine sand and dirt are washed away, and clumps of dirt and shells wash through the coarse mesh into the bottom tray. The big clumps that won't go through the coarse mesh have to be broken up by hand. Then you sort through everything, retrieve all the fossils in that load, wash out both trays and start all over again.

In order to use both hands to break up these large clumps, you have to sit down somewhere and put the trays in your lap. This poses some interesting problems, as you will later see.

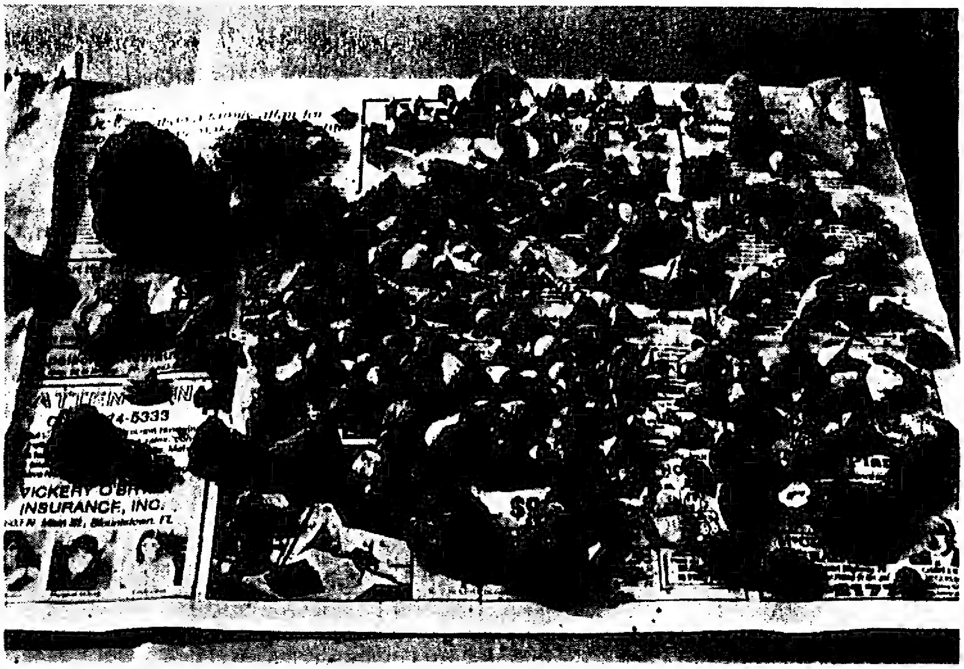
Once we got to the river, we were on our own. This kind of fossiling was new to Jakie and me, so we watched the others and followed suit. The river was very winding, with a steep bank on our left and a gentle slope on our right. The fossils, of course, were only to be found **in (not on)** the steep bank. The depth of the water varied considerably depending upon whether you were working at a bend (where the water was deepest) or on the straight-away. I was surprised at the swiftness of the current. We took careful note of the others and realized that the procedure seemed to be to pick a spot, sit down in the water facing the bank, put your nested boxes in your lap, and start digging the bank away so that it fell into your lap and filled your boxes. Then you schushed your boxes in the water. Later, as we got more into this operation, we figured out that we could gouge out a platform of sorts in the bank near the edge of the water so that we could sit on it instead of in the water.

There are pros and cons to all of these methods, as you can plainly see. Sue seemed always to be sitting at least waist -deep in the water. Harold had a keen eye for finding a rock or sand platform to perch upon. Emily's technique varied, and she did a lot of splashing around. I observed also that Harold is a "neat" fossiler who gets only as wet as is absolutely necessary. Sue was soaking wet and filthy within 5 minutes of arriving, and it took Jakie and me only a trifle longer. Emily keeps herself fairly tidy by a special dig-and-bathe procedure which we never mastered. I'm sorry that the photographs don't show these differences. I regret that Emily was our only photographer - thus we have no pictures of her unique techniques.



Part of the reason it took Jakie and me longer to register "10" on the scale of wet and dirty was that we tried to find rocks or fallen logs to sit on. I thought this system was good until I discovered that the crayfish were sampling my ankles. Apparently their favorite habitat was under the rocks and partially submerged logs that I was using as a seat. Their nibbling didn't actually hurt, but it was very distracting. Twice I tipped my trays over into the water in the process of chasing the crayfish away. That was a disaster because I had been digging in an area of river bank that was yielding dozens and dozens of lovely tiny murex! I didn't even bother to ask until the end of the day what species they were. All I cared about was finding them. I checked out lots of different places along the bank that first day, but I kept going back to the "crayfish motel", and by five o'clock when we finally called it quits, I was thrilled with the number of murex, typhis, and cones I had found.

Once back at the motel, we put our "finds" on newspapers on the hood of the car – to dry out, to display, and to have handy when we needed Emily to identify species. We always kept separate our lovely, tiny murex, typhis and trigonostoma, dried them carefully in paper towels and packed them carefully.



The job of cleaning ourselves was somewhat more difficult. We hosed off before entering our rooms. There was no hope for our clothes. The chemical content of the river water was such that after soaking in it for nearly nine hours, our shirts, shorts, and socks had turned dark brown – permanently. I knew I couldn't appear at breakfast in them the next morning (nor could I use them home at the condo even for yardwork), so each nite I deposited all but my sneakers in the trash barrel conveniently located outside our door. By the time we left, I hardly needed a suitcase. After our routine of happy hour, show-and-tell, and dinner, Jakie and I went to bed. I know she tried, once or twice, to stay awake and watch the Atlanta Braves baseball game, but in the morning she never knew who had won.

On Saturday, our second day out, we returned, without mishap, to our river. On the drive in, we stopped and picked some of those juicy blackberries. We intended to save them for lunch, but only a few remained uneaten when we took a break for our crackers, vienna sausages, and coke. We all tried some new sites and also returned to many of our old ones. I went farther up the river and found a wonderful rock to sit on. I would fill my tray and then wade out to my rock and sit down to wash and sort. At one point, when I had stopped in order to swat horse flies, I was startled to notice a snake (about 10 inches long) slithering up on my rock behind me. I had no idea what kind it was, but I'm not fond of snakes, so I packed up and returned to my crayfish. Of the two, I preferred them to snakes. It was a fun and profitable day for all of us. In testimony of my own luck at finding murex, I had begun to count out loud as I picked them out of my tray. I didn't realize that Sue was close enough to hear me until she called out loudly that she didn't appreciate being reminded of how many murex I was getting.

Sunday was our last day, and we all took samples from every likely spot we could find. I had decided I wanted no part of either snakes or crayfish, so I did a great deal of exploring upstream. I saw dozens of beautiful trout and some lovely scenery, but the fossiling was not to be compared with what I had found previously, so I gave up and went back to my original location. I stayed in deeper water to wash and sort in order to avoid "creatures". (Note in the photo how deep the water was even at the very edge of the bank).

Unlike our fossiling trips to "the pits", we were all delighted with what we found. Each new tray of materials yielded something! At no time did I hear anyone express disappointment as to either the quantity nor the quality of our fossils.

The fossiling was so good that we took lunch breaks in order to rest rather than because we were hungry, and we were disappointed when the hands of the clock crept around to 5 P.M. The trip, however, was not without mishap. Somewhere near 4 P.M. on Sunday afternoon, we suddenly heard Emily shout: "Oh my gosh, I've never seen one this big!" We all got up immediately and started wading in her direction. In view of all the fossils she has access to at Tulane, we knew it had to be a real treasure. Anything less would not have produced such an outburst from Emily. She had been around the bend from us most of the day sitting in water up to her armpits digging in the bank above and beside her. As we moved toward her, she called out: "I'll show you!" Just as we rounded the bend and saw her coming toward us with her hand outstretched, she suddenly disappeared. Between the bank where she had been working and the middle of the river was a very deep trough gouged out by the swift current as it swirled around the bend - and Emily had stepped into it - and dropped the shell. Even if one of us had had a mask, the color of the water would have prevented our seeing the bottom, and the depth of the water into which she had completely disappeared made it impossible to feel for the shell on the bottom with our feet. We did try, but it was a hopeless task. The fossil was a *Typhis obesus* approximately 2 inches long. If Emily Vokes was that excited about finding it, she must have been devastated about losing it - but she was very philosophical about it and remarked that at least she had had the fun of finding it. That turn of events put a damper on things, and we packed up soon after. Before we left, however, Emily filled several canvas bags with material from that site to bring home and sort through "when we have free time".

After discarding our clothes, showering, and reminiscing about our three glorious days, we went out and enjoyed a tasty barbecued rib dinner. We packed that night in order to get an early start for our nearly 500-mile trip home on Monday. We arrived by late afternoon: tired, covered with horse fly bites which we treated for nearly a week, but ready to do it again if given the chance.

What did we find? The following is a fairly complete list:

Murex (Haustellum) gilli Maury
Chicoreus (Chicoreus) lepidotus Vokes
C. (C.) elusivus (Vokes) [fragments]
C. (C.) dujardinoides (Vokes)
C. (Phyllonotus) folidodes (Gardner)
C. (P.) infrequens (Vokes)
C. (Siratus) juliagardnerae Vokes
C. (S.) nicholsi (Gardner)
C. (S.) chipolanus (Dall)
Hexaplex veatchi (Maury)
Poireria (Panamurex) lynchia (Gardner)
P. (P.) mauryae Vokes
P. (P.) fusinoides (Gardner)
P. (P.) laccapoia (Gardner)
Murexiella (Subpterynotus) textilis (Gabb)

Ceratostoma virginiae (Maury)

Typhis (Rugotyphis) keenae Gertman
T. (Typhinellus) chipolanus Gertman
T. (Talityphis) obesus Gabb

Pterotyphis (Tripterotyphis) vokesae

Siphonochelus (Laevityphis) linguiferus
(Lots of these!)

Vasum haitense
Vasum elongatum

Xancus chipolanus Dall

Busycon aldrichi Gardner
Busycon sicyoides Gardner

Phos chipolanus

Conus chipolanus Dall
Conus harveyensis Mansfield

Strombus aldrichi Dall
Strombus dodoneus Gardner
Strombus chipolanus Dall
Strombus orthaulax

Plus: sinum, mitres, dentalium, turrids, architectonica, terebras, and trigonostoma.

You are doubtless wondering why we didn't find any bivalves. We did, but since they are the mainstay of the pits we previously had access to at home, we really didn't pay any attention to them. If I had seen any of those huge pectin (about 6 inches across) that I treasure from the De Soto pits, I would have paid a great deal of attention. I don't recall that I came across any barnacles, nor did I see any pieces of coral. I love the little barnacle clumps we used to find at Sarasota, and I would have been thrilled to bring back some of those. When I think of all the things we did find, the lack of barnacles is inconsequential.

You may wonder, too, at the obviously deliberate omission of any details as to what route we took, what town we stayed in, what river we were in, etc. We were in an upper Miocene area which, of course, is much earlier than our local sites. We were on private property. The Vokeses had secured special permission for us to fossil for those three days. In view of what happened locally when irresponsible people presumed to trespass, it seemd only logical for me to omit any details which might tempt similar trespassing at this location. It was a truly unique experience, and one which I shall always treasure.

For Jakie and me, it was not just the fossiling we enjoyed. It is very special to be with people who are not only extremely knowledgeable about the shells and the geological history of the area, but who are so willing to share that knowledge. Emily and Harold Vokes are both teachers in the finest sense of the word. They discuss things in a way that elicits questions. When talking with them, you never have to feel reticent because of your lack of knowledge. They instinctively create an atmosphere of easy give and take, and they seem so willing to share their vast knowledge. The Vokeses are truly special people.

Do you blame us for wanting to go again? I told you at the outset that a VOKES TOUR was not like any other. Now that our trip is over, I have many wonderful memories and one wish" that the canvas bags which Emily brought home to go through later might contain a Typhis obesus to replace the one that got away!

(reprinted from The Junonia, Sanibel-Captiva Shell Club, December 1993)

Philadelphia Shell Show in November

The Philadelphia Shell Club will hold its annual shell show on November 5 and 6, from 10 AM to 5 PM at the Academy of Natural Sciences, 19th and the Parkway, Philadelphia, PA. For the first time, this will be a judged show, the judges being Al & Bev Deynzer, Showcase Shells, Sanibel, FL and Walter Sage of the American Museum. Plan to travel the two hours to Philadelphia the first weekend of November and see a fine shell show and visit the booths of the dealers who will be selling there.

Good Shelling on Sanibel

During the Sanibel Shell Fair in early April, 1994 it was reported that shelling was especially productive. Betty Jane Peak of Lubbock, Texas wrote the following to Lucille and Dave Green - "I also beachcombed two of the lowest tides I have seen on Sanibel since 1970. March 3rd and 4th after midnight - horse conchs, Florida fighting conchs, VanHynings cockles, tulips, figs, pectens and arks were so thick you could hardly step without stepping on them." What we hear so much these days is that there are few or no shells to be found. The above report shows that shells are there - the time just has to be right. I am also reminded that we must observe the shelling limits in order to have more shells for future low tides.

Florida Scallop and Oyster Fisheries Depleted

Newspaper cuttings sent by NYSC member Dorothy Germer tell sad tales of the former plentiful bivalves of the west coast of Florida. Dwindling scallop stocks forced state officials to declare a temorary ban on collecting scallops south of the Suwanee River. Official vote this Fall on a permanent ban on scallop harvesting in those areas. The floodwaters that devastated the Florida Panhandle this summer wiped out Apalachicola Bay's summer oyster harvest and threaten the winter season. This is considered the worst blow to the region's shellfish industry since the mid-1980s.

Florida Vacationers Weren't Warned that Gathering Shells Can be Illegal

During the week of June 12-19, a friend and I, along with four other couples, visited Key Colony Beach in the Florida Keys, for a hrad-earned, relaxing "Florida Vacation".

Having never been to the Keys, we called the Chamber of Commerce. We received a packet of brochures, read them as carefully as possible and selected a rental house.

Before leaving for Florida, we asked the realtor if there was anything we needed to know regarding the area. Since we were planning to bring two boats down with us, we were informed that we would need fishing licenses and that lobsters were not in season. Additionally, we called the Florida State Patrol to determine whether our trailer had to be licensed separately in order to travel in Florida. We were told just to "come on down".

Upon arriving, everyone purchased fishing licenses. The men bought them at Captain Hook's Marina in Marathon, the ladies purchased them at K-Mart. No brochures or other information were provided with the licenses.

The ten of us proceeded to have some "fun in the sun" by driving our boats around to the sandbar in front of our house. We snorkeled, fished and collected shells. Each day, we cleaned our shells which consisted mostly of hermit crabs, fed the meat to the fish under our dock and left the shells out on the patio and dock to bake in the sun. Little did we know that some of our sea treasures were on an endangered species list.

Our neighbors certainly knew, however! Instead of warning us, they reported us to the police. After the shells were proudly displayed in public view for the entire week (we had nothing to hide), a force of various law enforcement officers descended upon us the day before our departure, informing the men present that they were under arrest and to remain silent until their rights were read to them. Included in this "force" were three or four police vehicles in front of our house and two police boats at our dock in back.

The officers arrested one lady, charging her with harvesting 17 illegal conchs and three starfish. Warning tickets were written to four men. The fine for the second degree misdemeanor totaled $630. We learned from other Floridians that we were "let off easy". All of the shells, including the legal ones, were confiscated. But I can assure you, we did not argue.

We do not fault the law enforcement officers involved in this fiasco because they were merely doing their jobs. However, this extremely upsetting ordeal brings me to a couple of comments and questions.

If the State of Florida is actually trying to protect the Queen Conch, the tourists need to be informed. Not one person out of our group ever saw a sign or any other warning about the Queen Conchs or a starfish. Unfortunately for us, we had never seen a brochure given us by the officers called "Know Your Limits". The law enforcement officers informed us that when buying a fishing license one should have been provided. We also were unaware, until told by the officers, that the conch we ate in restaurants came from the Bahamas.

We realize that ignorance is no excuse, but as law-abiding citizens, we did try to find out as much as possible about Florida laws before our vacation. If the State of Florida is trying to collect revenue and scare tourists, the system currently in place is working smoothly.

(Diane Sedgewick from the Charleston, SC Post & Courier, August 1993)

ALWAYS be sure to know what mollusk and other species are prohibited when going to a new area. Many states now require licenses and have limits - it is up to you to know the regulations and avoid an unpleasant and costly experience.

THE NAUTILUS 107(1):29–32, 1993

The Rediscovery, Morphology, and Identity of *Conus emersoni* Hanna, 1963

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ABSTRACT

Conus emersoni is reported from 310 m off Isla Santa Maria (Floreana), Galapagos Islands, the first record subsequent to its original description. The species is redescribed from eight additional specimens; its operculum, radula, and periostracum are described for the first time. Affinity of the species to *C. teramachii* Kuroda, 1956, is discussed.

Key words: Conidae, *Conus emersoni*, Galapagos Islands, radula.

INTRODUCTION

Subsequent to its description 29 years ago (Hanna, 1963) from two dead, faded and poorly preserved specimens, *Conus emersoni* has remained an enigmatic member of an otherwise extensively studied genus in the Eastern Pacific region. Even as he proposed the species, Hanna (1963) suggested that it might be conspecific with the Indo-West Pacific species *C. australis* Holten, 1802, whereas Walls (1979) placed it as a possible synonym of another Indo-West Pacific species, *C. orbignyi* Audouin, 1831. Keen (1971) treated the species as valid but made no comments on its relationships. Finally, Coomans *et al.* (1986) considered it to be a tentatively valid species but noted that it could be based on fossil material.

Here we report upon eight recently collected specimens from moderately deep water at the Galapagos Islands, two of which are in the collections of the Natural History Museum of Los Angeles County and six in the American Museum of Natural History. All were provided by André and Jacqueline DeRoy, residents of the Galapagos Islands. These specimens extend the distribution from Cabo San Lucas, Baja California Sur, to the Galapagos Islands, Ecuador, and allow a redescription of the species with the first report on the morphology of the radular tooth, the operculum, and the periostracum.

Abbreviations of museums mentioned in the text: AMNH, American Museum of Natural History, New York; CAS, California Academy of Sciences, San Francisco; LACM, Natural History Museum of Los Angeles County.

SYSTEMATICS

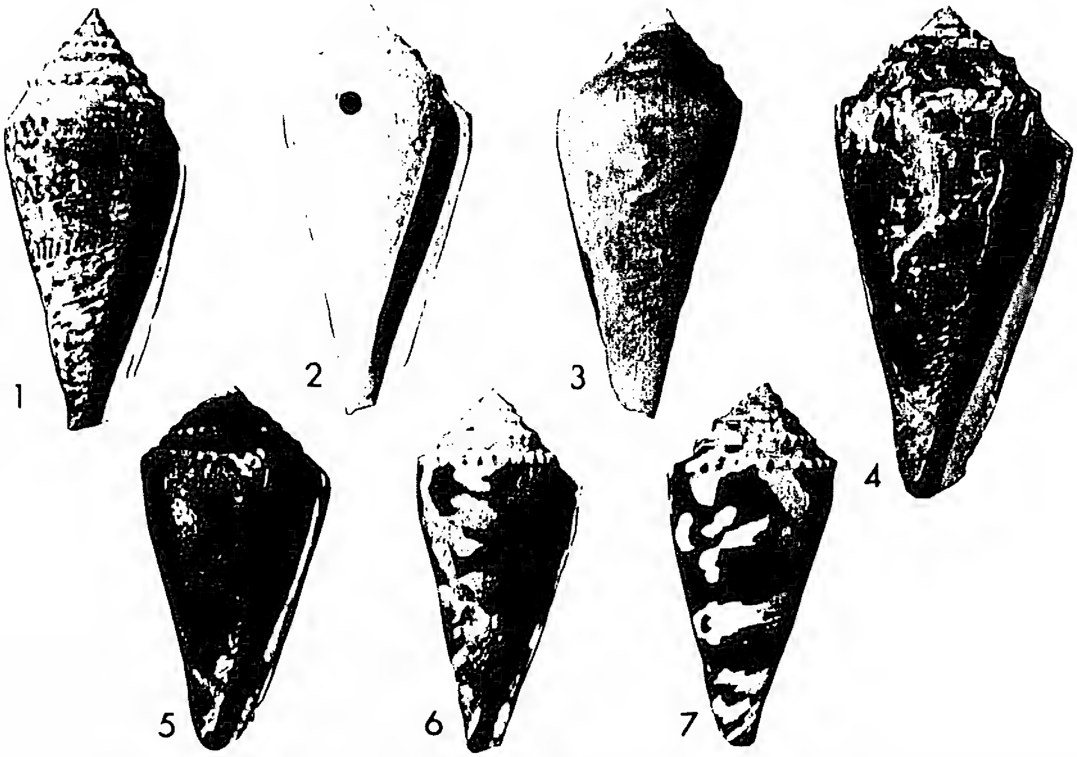
Conus emersoni Hanna, 1963
(figures 1–13)

Conus emersoni Hanna, 1963:25, pl. 1, fig. 2; Walls, 1979:776 [with unnumbered figure of CAS paratype]; Coomans, Moolenbeek & Wils, 1986:114, fig. 718 [holotype, 2 views].
Conus (*Asprella*) *emersoni*; Keen, 1971:663, fig. 1497 [holotype].

Diagnosis: Spire scalariform throughout its length, shoulder angle retaining square nodules; sculpture on final whorl of numerous, closely spaced, shallow sulci; posterior notch shallow; whorl tops sculptured by one to two cords that fade in whorl three to be replaced by numerous fine striae.

Description: Shell elongate-conical, whorl sides flat to very slightly convex; shoulder angular. Anterior end not deflected dorsally. Sculpture of numerous (30–50) closely spaced, shallow sulci, most pronounced at anterior end and fading in intensity towards shoulder. Color pattern variable, consisting of three irregularly developed bands, at shoulder, in area just posterior to midbody area, and in area just anterior to midbody. Bands variously interrupted and scalloped, producing reticulate or blotched pattern; bands separated by areas with rows of spiral dashes or longitudinal reticulations. Dashes and reticulations may be quite pronounced (holotype) or lacking (Galapagan specimens). Anterior end marked by spirally elongated blotches or lines. Color markings in fresh specimens medium brown, fading to light brown in dead specimens.

Spire very slightly convex in profile, scalariform throughout and moderately elevated, carinate, carina interrupted by numerous square nodules, 30–40 per whorl; nodules fading in whorl six although carina may remain pronounced. Protoconch unknown (not intact in any of the specimens). One or two spiral cords on first two or three teleoconch whorls, replaced on later whorls by numerous, exceedingly fine striae. Whorl tops colored by variably developed markings, matching those of body whorl, between nodules or crossing entire width of whorl



Figures 1–7. *Conus emersoni* Hanna, 1963. **Figures 1–3.** Type material dredged off Los Frailes, Baja California, depth 549 m. **1.** Holotype, AMNH 105211, length 43.0 mm, faded, dead-collected specimen, lacking periostracum. **2, 3.** Paratype, CAS 12405, length 49.0 mm, subfossil specimen (surface gray), showing naticid bore hole. **Figures 4–7.** Newly reported specimens dredged off Isla Santa Maria (Floreana), Galapagos Islands, Ecuador, depth 310 m. **4.** AMNH 248261, length 46.2 mm, dead-collected specimen. **5.** LACM 146906a, length 33.3 mm, live-collected specimen with periostracum intact. This specimen was used for opercular and radular illustration. **6, 7.** LACM 146906b, length 34.0 mm, dead-collected specimen with periostracum removed to show color pattern.

top. Whorl tops slightly but distinctly concave in cross section. Posterior notch shallow and C-shaped.

Aperture narrow, white inside except where exterior coloration shows through near lip. Interior constrictions and apertural flanges absent or at least not developed in available specimens.

Periostracum thick, dark brown, markedly pilose both on body and spire. Extremely fine hairlike extensions of periostracum not organized into any obvious pattern. These projections are apparently easily worn off, as they are pronounced on the dorsal side of one live-collected specimen (figure 5) but are not obvious on the ventral side of the same specimen.

Dimensions (see table 1): The known specimens range in length from 23.0 mm to the 49.0 mm length of the paratype (figures 2, 3). The ratio of width to length ranges from 0.43 to 0.50 (table 1). The largest Galapagan specimen (figure 4) is 46.2 mm in length. All specimens have the protoconch eroded, the spire tips filled by secondary shell deposition.

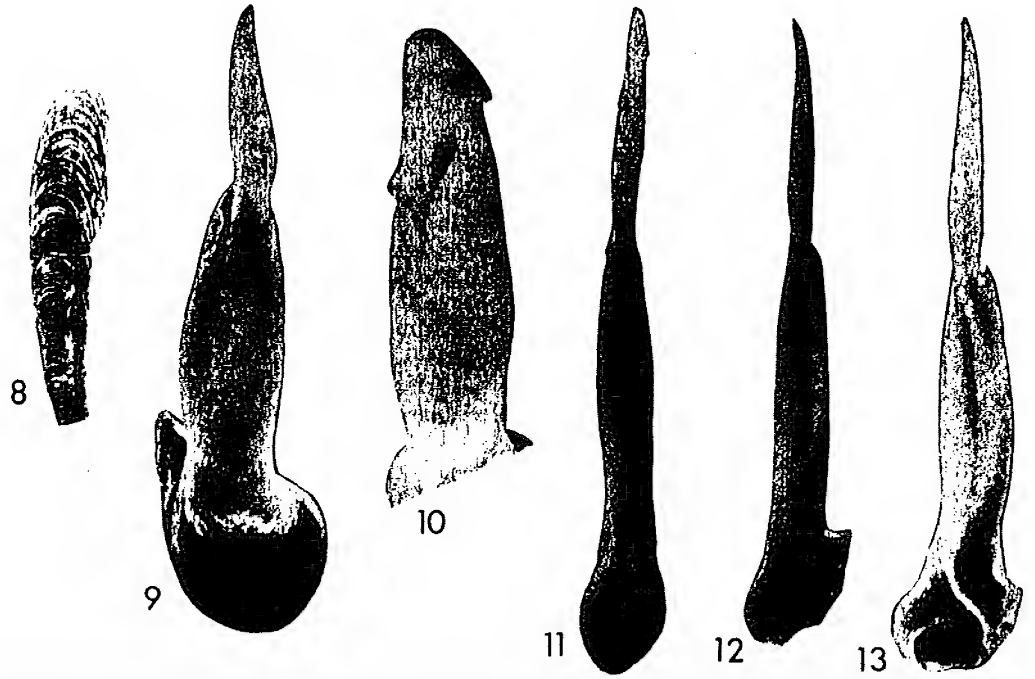
Operculum illustrated in figure 8 is 27% of apertural length, weakly serrate on outer edge.

Radular tooth (figures 9–13) small, 285 μm in length; massive base with pronounced basal spur; waist located on anterior half of tooth, with small spine on posterior border in same plane as basal spur. Tooth opening rather long, extending about one-quarter the length. Tip with small barb opposite short blade.

Distribution: The holotype and one paratype were collected off Los Frailes, Cape San Lucas, Baja California in 550 m (given originally as 300 fathoms by Hanna, 1963). The eight newly discovered specimens were dredged in 310 m (170 fathoms) off Isla Santa Maria (Floreana), Galapagos Islands, 7 May 1979 by André and Jacqueline DeRoy (table 1).

DISCUSSION

The rediscovery of *Conus emersoni* in the Galapagos Islands should put to rest speculation that this species is a synonym of either *Conus australis* (suggested by Hanna, 1963) or *C. orbignyi* (suggested by Walls, 1979). Each of these Indo-Pacific species is unlike *C. emersoni* in having persistent sulci on the body whorl along with persistent cords on the spire whorl tops. *Conus emersoni* differs in having the sulci strong only anteriorly and in having fine spiral striae on the whorl tops. Radular differences are that the radular tooth of *C. orbignyi* has three anterior barbs (Kilburn, 1973: fig. 6), whereas that



Figures 8–13. *Conus emersoni* Hanna, 1963. **8.** Operculum, same specimen as figure 5, length 7.3 mm, nucleus lost. **Figures 9–13.** SEM views of single radular tooth, length 285 µm, from same specimen as in figure 5. SEM photos by H. Chaney. **9.** Oblique anterior view showing apical surface, with pronounced basal spur and small spine on posterior border of waist. **10.** Enlarged view of apical surface, with small barb and enrolled blade. **11–13.** Three lateral views, showing differing axial rotation of tooth.

of *C. emersoni* has but two. The radular tooth of *C. australis* has a serrate shaft along with an enlarged cusp at the posterior end of the row of serrations (A. J. Kohn, radular slide collection); neither feature is present on the radular tooth of *C. emersoni.*

The scalariform spire and color markings of *Conus emersoni* have a superficial resemblance to that of the Panamic species *C. emarginatus* Reeve, 1844 (a species often misidentified as *C. recurvus* Broderip, 1833). Differences are that *C. emarginatus* has a deep posterior notch (rather than shallow notch) and a smooth (rather than pilose) periostracum. The radula of *C. emarginatus* (Nybakken, 1970: fig. 5, as *Conus recurvus*) has three barbs anteriorly, like that of *C. orbignyi,* rather than *C. emersoni,* in which there are two barbs.

The scarcity of *C. emersoni* may be due to the great depth at which it occurs and the paucity of sampling at depths below 300 m.

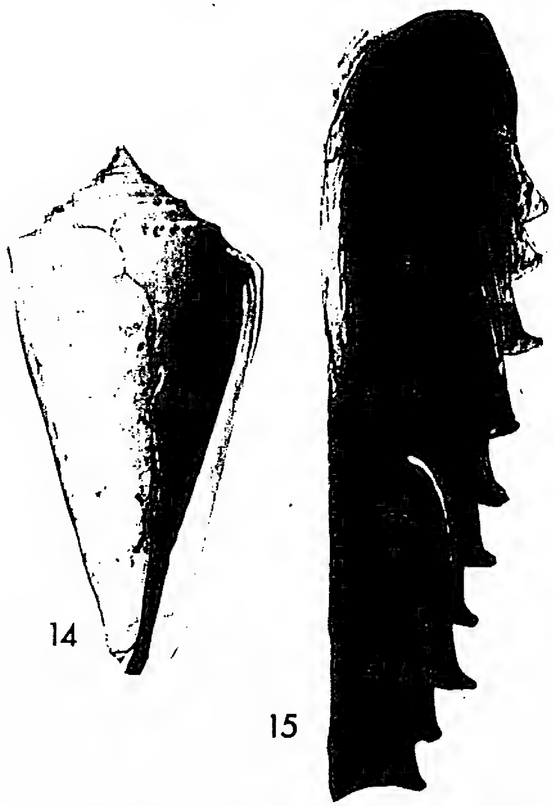
It is possible that the specimens from the Galapagos Islands are specifically or subspecifically distinct. They differ in color pattern (that of the holotype being more intricate) and in spire profile (that of the holotype appearing to be more acute). However, such intraspecific differences in color pattern are not uncommon in *Conus.* In fact, the faintly indicated color pattern of the paratype that shows on the better preserved dorsal surface (figure 3) is more similar to that of the Galapagan specimens (figures 5–7) than to that of the holotype (figure 1). The ground color of the paratype has a gray cast that is suggestive of fossil or subfossil condition. The holotype is in fresher condition, although it retains no periostracum; it shows evidence of growth damage to the shoulder at a stage two whorls above the termination of the lip, which appears to have altered the profile of the final two whorls, resulting in a greater downward slope to the spire and the loss of the nodules in the final two whorls.

The question as to whether the two widely disjunct records represent the same species can only be answered after additional specimens from the vicinity of the type locality become known. It is our opinion, based on the specimens examined, that there is no clear evidence to suggest that the Galapagan specimens are not conspecific with the Mexican specimens.

Conus emersoni is not closely similar to any other eastern Pacific conid. Shell morphology, including the

Table 1. Shell dimensions and proportions of the known specimens of *Conus emersoni* Hanna, 1963.

Specimen	Condition	Length	Width	Width/ length
AMNH 92200 (holotype)	dead	43.0	18.5	0.43
CAS 12405 (paratype)	subfossil	49.0	22.5	0.46
LACM 146906a	live	33.9	17.0	0.50
LACM 146906b	dead	34.0	15.5	0.46
AMNH 248262	live	35.0	15.7	0.45
AMNH 248263	live	31.5	14.3	0.45
AMNH 248261	dead	46.2	22.3	0.48
AMNH 248169a	live	23.0	10.8	0.47
AMNH 248169b	dead	30.0	14.9	0.50
AMNH 248169c	live	26.8	12.8	0.48



Figures 14, 15. *Conus teramachii* Kuroda, 1956. **14.** Specimen with growth scar producing lowered shoulder angle of final whorl, periostracum removed. Off NE coast Taiwan, trawled, depth unknown. LACM 68994, length 79.8 mm. **15.** Operculum with strongly serrate edge, nucleus lost, trawled off Taiwan. Specimen in H. Chaney collection, length 19.1 mm.

shoulder carina with square nodules, is similar to that of *C. teramachii* Kuroda, 1956 (figure 14), a species reported from similar depths off Japan and Taiwan (Kuroda, 1956; Walls, 1979). Our illustrations of the radular tooth of *C. emersoni* (figures 9–13) are comparable to those of Azuma (1961: fig. 11) for *C. teramachii* (as *C. petricosus* Azuma, 1961). In addition, *C. teramachii* also has a strongly serrate operculum (figure 15), much more pronounced than that of *C. emersoni* (figure 8). The character state of the serrate operculum was stressed in the original diagnosis of the subgenus *Profundiconus* Kuroda, 1956—type species *Chelyconus* (*Profundiconus*) *profundorum* Kuroda, 1956 [= *Conus smirna* Bartsch and Rehder, 1943]. The type species of *Profundiconus* also has square nodules on the shoulder carina, but these are apparent only in young stages.

We refrain, however, from further treatment of the subgeneric allocation of the species under discussion because comparison to other available generic level taxa is beyond the scope of this paper. We recognize that a generic level classification of Conidae needs to be based on all the recognized species, including fossils, at a minimum treating characters that include adult and juvenile shell morphology, and, for the living species, the operculum, and radula.

ACKNOWLEDGMENTS

We thank Alan J. Kohn of the University of Washington for allowing one of us (JKT) to study his radular slide of *C. australis*. William K. Emerson and Walter E. Sage of the American Museum of Natural History made the holotype and other specimens of *C. emersoni* available for study. Terrence M. Gosliner of the California Academy of Sciences arranged for loan of the paratype specimen. We thank Henry W. Chaney of the Santa Barbara Museum of Natural History for the SEM photos of the radular tooth of *C. emersoni* and the photograph of the operculum of *C. teramachii*. We are grateful to Henry W. Chaney, William K. Emerson, Alan J. Kohn and Walter E. Sage and two anonymous referees for reading the manuscript and offering helpful suggestions. Finally, and most importantly, we thank Jacqueline and André DeRoy for providing the specimens of *C. emersoni* that form the basis for this paper.

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SCHEDULE OF MEETINGS

1994 - 1995

PLEASE NOTE: There may be differences in the dates and/or places for meetings from those given below. Consult the current issue of N.Y.S.C. NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

September 11, 1994
October 9, 1994
November 13, 1994
December 11, 1994
January 8, 1995
February 12, 1995
March 12, 1995
April 9, 1995
May 14, 1995
June 11, 1995

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, starting at 2 P.M. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying a fee by presenting your New York Shell Club membership card.

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September to June, Room 319 of the American Museum of Natural History, New York City (unless otherwise advised). Present NYSC membership card for admission to the Museum on meeting dates.

PROGRAM SCHEDULE

SUNDAY, December 11, 1994 at 2:00 p.m. - Long Island Shell Club Member and veteran lecturer Hank Foglino will present "Sound in the Sea" and "Tides, What Causes Them."

SUNDAY, January 8, 1995 at approximately 2 p.m. NYSC Past President and famed interior decorator Fred Cannon will open his Brooklyn home to Shell Club members.

SUNDAY, February 12, 1995 at 2:00 p.m. "Focus on Conchology" - program by Richard L. Goldberg, World Wide Specimen Shells

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Many of you know by now that I underwent surgery for a malignant tumor in the mouth on November 23. I came home on December 5 and have been recuperating since. I will have a series of radiation treatments in the next few weeks, and then I hope all will be "back to normal." Sincere thanks to all who showed their care and concern with cards and telephone calls. These really helped me through this. Marie Sussman, a long-time member, is also recovering from a recent hospital stay.

W.S.

HIGHLIGHTS OF RECENT MEETINGS

June 12, 1994. President Al Scarpetti reported briefly on the progress of plans for a trip to the New York Aquarium, and noted that Fred Cannon was suffering from pleurisy. He said that he and Walter Sage had visited Leon Juster during the previous week, picking up shells that Leon had donated to the Club.

Treasurer Theta Lourbacos said that we will probably be able to meet in Room 319 all through the coming year. Nick Katsaras displayed an excellent specimen of Conus princeps and commented upon it.

In the annual election of officers, the chairman of the Nominating Committee, Milton Werner, presented the following slate of candidates: President, Ed Cowles; Vice President, Larry Potter; Recording Secretary, Milton Werner; Treasurer and Membership, Theta Lourbacos; Historian, Nick Katsaras; Directors, Walter Sage, Allen Aigen and Al Scarpetti, who will also serve as Program Chairman. There being no nominations from the floor, it was moved that the Recording Secretary be empowered to cast one vote for the entire slate.

Al reported the recent deaths of Rose D'Attilio, Anne Taxson and Mary Kline.

The door prizes were Marginella interruptolineata, won by Ed Cowles; Neorapana muricata, won by Nick Katsaras; Tellina radiata, won by Eli Horowitz, and a copy of "Shells - Pleasure and Treasure," by Roderick Cameron, won by Harvey Frajlich.

The speaker was Mel Springer, who described a shelling trip to Thailand that he and wife Sylvia had enjoyed a year and a half previously. Starting with scenic photos taken in Bangkok, he went on to Phuket, where the collecting was good in tide pools as deep as 20 feet and more, and where he took some underwater photos. Another stop was the Phi Phi Islands, where the shelling was productive just off the beach. The return trip included a stop at Taipei, where Mel kept his camera clicking. The question-and-answer session that followed was animated and long.

September 11, 1994. The speaker was Gertrude Moller, a founding member of the Jacksonville, Florida, Shell Club. She presented slides and descriptions of "Solomon Islands Shelling." After landing at the Guadalcanal Airport, the visit to the World War II area of the Solomon Islands began. The group consisted of the tour guide (male), six women and one man, all snorkelers. There was little pollution and the native people were helpful and friendly. Provided with protective clothing from the sun and reef-walker shoes, the party explored high-tide lines and reefs for shells in the morning, then spent the afternoons cleaning shells. On the sea bottom were the sunken ships of World War II.

The color slides of sea, islands and people were beautiful and very interesting. The Solomons, called "the islands that time forgot," cover 1.35 million square kilometers. There are 923 islands, of which 347 are home to a population of 346,000. Rain forest covers 90% of the land area and there are 3,400 plant species, used for food, medicines and clothing, and as building meterial. There is a chief on every inhabited island.

The members of the group found many beautiful live shells, both common species and rarer ones. The high-tide line produced many treasures and many were found by snorkeling at the reefs, the only drawback being the occasional sighting of a shark fin! The group found the trip very rewarding and several plan to return.

During her weekend in New York, Gertrude was the houseguest of member Ray Corbeil.

Door prize winners were as follows; David Epstein, Fulgararia doviesi; Henry Gordon, Oliva porphyria; Dorothy Traub, Crytopleurea costa; Harold Traub, book, "The Shell".

October 9, 1994. President Ed Cowles presented the Shell of the Month, which was Concholepas peruvianus, a gastropod whose heavy shell, when empty, looks like one valve of a bivalve. Because it's a food delicacy in Peru and Chile, it has been heavily overharvested.

New members Fran Stoia, and Walter Fisher and his son Daniel, were introduced.

The door prizes were Cymbium broderini, won by Irv Hoppenwasser; Turbinella angulata, won by Dan Jacobs; Spondylus americanus, won by Ed Cowles, and a copy of "Guide to Shells," by A.P.H. Oliver, won by Walter Cherwak.

The speaker was Maxwell (Mickey) Cohen. When he last addressed the Club, he was chairman of oceanography at Beach Channel High School in Rockaway Park, where his marine-oriented pupils were avid readers of "Shell Notes", even compiling an index to help in their work. Mickey retired from teaching in 1982 and now, with his wife, Barbara, manages Bayswater State Park in Far Rockaway.

The theme of his presentation was "There is much more than just shells on the beach." Accompanying his talk with slides, he offered a "who's who" of the marine life of local waters. Many of his observations were surprising to amateur beachcombers. The force of waves crashing on the beach, for example, reaches 3,000 pounds per square inch. Noting that sponges are animals, not plants as is widely believed, he said that there are a half-dozen local species. The highly poisonous lion's mane jellyfish, while not local, appears on Long Island beaches, especially heavily during the last 20 years. The Portuguese man-o-war also shows up. Thirty years ago it infested the waters of the Rockaways. Mickey's recommended antidote for the painful stings of these creatures is an application of meat tenderizer. The hydroids responsible for this misery are a prey of nudibranchs, which can be collected locally, especially on the pilings and similar places where hydroids grow.

The organism that Mickey finds most exciting is the seasquirt. This comparatively primitive animal bears the signs of a spine as a work in progress.

November 13, 1994. Program Director Al Scarpetti announced that the speaker at the December meeting will be Hank Foglino of the Long Island Shell Club. On January 8 we will gather at Fred Cannon's home. Rich Kelly of the LISC will speak in March, and Maxwell Cohen in May. The February and June programs are not yet set. Al also said he had the addresses of a California and a Philippines dealer for anyone interested.

The door prizes were a Conus ammiralis, won by Dan Jacobs; Conus circumcisus, won by Irv Hoppenwasser; Cypraea citrina, won by Al Scarpetti, and Murex japonica, won by Rose Kurss.

The speakers were Carl and Denise Ehrlich, who described a recent collecting trip to St. Vincent and others of the Grenadines, in the Windward Island group. The diving there, they said, is excellent. They collected at depths of 3 to 60 feet, but mostly at about 30 feet. The bottom is dark sand. Carl commented on the hours and phases of the moon that bring the best shelling, with nighttime being the better half of the day.

Denise provided narration to 20 minutes of video tape, which they had edited down from two hours. It featured Isabella Island, second largest in the Solomons, and included shots of the resident expert and collector, Brian Bailey, and many shells. Carl noted that Conus gloria-maris favors black sand, near a river mouth.

The shells they had on display included gloria-maris and others from the Solomons, but most represented the booty from the Spanish Main. The genera were Conus, Voluta, Murex, Harpa, Mitra and Bursa, with special emphasis on Conus cedo-nulli.

A lengthy question and answer period elicited observations not only on shells, but also on the local peoples and travel and collecting experiences.

M.W.

The joint "field trip" of the New York Shell Club and Long Island Shell Club was held on Saturday, November 5 at 11:00 a.m. Good reports have been had by all who attended and it is said that the guide was even better than on our previous trip.

Long Island Shell Club President Ken Ehalt is planning a field trip, probably for Spring, 1995 to the Fire Island Lighthouse out on Long Island. This should be an interesting trip. If you would like to know more about this, contact our Program Chairman, Al Scarpetti, for details.

Regarding the donation of shells to the New York Shell Club by Leon Juster, these shells have been sorted, listed and are now ready for NYSC members to prepare them for the April Auction and Social. These shells, in three cartons, along with two boxes of shells given to NYSC by Bob and Dottie Janowsky, are in Room 68 of the Department of Invertebrates, across the hall from Walter Sage's office. Plans need to be made to organize these shells for the auction, as it is doubtful at this time that Walter Sage and Sol Weiss will be able to handle the auction in 1995.

Most of you have heard that Walter Sage will no longer be doing NYSC NOTES after the June, 1995 issue. It's time for new blood and I no longer have time or energy for this task. So we need to have someone come forward (it can be more than one person) to take over this task. Let's face it, what I have been doing is mostly repeating from other publications what I think are interesting articles, and we all read some shell publication. Contributions from any and all members are always welcome - and needed!

W.S.

Gloriamaris

Conus gloriamaris - the world's rarest!
The glory-of-the-sea, the great rarity
sought by kings and fools
in distant tropic pools
Patterned like a tent
in a golden firmament
in the glory-of-the-sea.
is found eternity.

David Epstein - 1994

News Release, anytime
Sept. 28, 1994
From the Bailey-Matthews
Shell Museum
P.O. Box 1580
Sanibel Island, FL
33957
Contact Person:
Dr. R. Tucker Abbott
(813) 395-2233
(nite: 433-5260)

Raymond Burr's Seashells on Display

"Brick by brick we'll build a memorial to this grand actor and lover of nature and mankind" --- R. Tucker Abbott.

The creation of a Shell Museum was a major goal of Raymond Burr's. Death last year cut short his final episodes in the "Perry Mason" series, and prevented him from helping to make his dream come true. Now every admirer of this kindly man can express their affection for Raymond and their appreciation of his contributions to the performing arts, the traditions of American law and the natural sciences by personally giving a $100 brick to the Raymond Burr Memorial Circle.

Brick by brick we shall create a memorial circle in front of the Shell Museum. Every brick will bear the engraved name of each person who wishes to say "farewell" to that grand American personality. Our goal of ten thousand bricks will be an everlasting reminder of this generous man and his sound principles.

Through the kindness of Raymond Burr's partner and fellow shell collector, Robert Benevides, we are privileged soon to put on exhibit a gorgeous series of cowries, cones and other shells personally collected by Raymond and Robert on their island of Naitaumba in Fiji in the 1970's. This sparkling display of choice specimens in our Preview Center on Sanibel Island, Florida, will awaken in all of us the wonderment of creation and the miracle of the mollusk. The mission of the Bailey-Matthews Shell Museum is to awaken mankind to his self-made threat to his fragile living space, known to us as The Earth.

Write your memorial contribution check for $100, or phone in (813) 395-2233 your Visa/Master contribution, to:
The Shell Museum, P.O. Box 1580, Sanibel Island, FL 33957

[Further information: Wall Street Journal, Mar. 18, 1994. Front page; U.S.A. Today, Wed. Sept 28, 1994, Cover Story, Section D, front page.]

LIVE SHELLING BAN APPROVED!

by R. Tucker Abbott (Sanibel, FL's ISLAND REPORTER, Nov. 25, 1994)

Governor Lawton Chiles signed into law Tuesday a regulation authorizing the city of Sanibel to regulate and prohibit the collecting of any live shells within its city limits.

The banned shells include live mollusks - which include marine, land and/or freshwater snails, slugs or bivalves - or live echinoderms - sand dollars, starfish and sea urchins.

The city limits include all of the dry island, the low tide flats and offshore submerged area 1/2 mile beyond the mean high-tide mark.

These new regulations, which go into effect Jan. 1, 1995, do not change the present rules for those collecting live shells in other places in Lee County, such as Captiva, Cayo Costa and Pine Island. The current law, passed in October 1987 on Sanibel and in September 1993 in Lee County, states: "No person shall harvest [collect] or possess more than two live shellfish [mollusks or echinoderms] of any single species, per day."

Serious Sanibel beach collectors should not despair. Many live specimens that roll ashore in abundance every few months, or alas, every few years due to special oceanic conditions, are apt to die of exposure or lack of food within a day or so.

For sympathizing souls who wish to throw back live stranded shells, Section 46-26.002 (paragraph 3) has been added: "Temporary possession of a shell for the purpose of determining whether it [the live mollusk] contains a live shellfish shall not constitute harvest, so long as such shellfish is not harmed in any manner." But be aware that a Miami biologist has evidence that the violent flinging of a living Florida Fighting Conch back into the sea can rupture the snail's attachment muscle and cause its death. Furthermore, live *Pinna* pen shells to be properly rehabilitated should be taken out to sea and re-buried about six inches down into the soft sand bottom at least 1/2 mile from the shoreline, otherwise crabs, worms and fish will devour them. Care, too, should be exercised when having your lawn or garden raked of debris. Hundreds of living *Polygyra*, *Euglandina* snails and deleterious, plant-eating slugs should not be accidentally collected.

There are three exceptions to the new shellfish rules for Sanibel and Lee County:
1) The Department of Environmental Protection may issue permits to harvest or possess more than two live shellfish of any single species within [all of] Lee County. The source of these requests must come from or be initiated by legitimate educational or non-profit institutions such as universities, museums and schools.
2) Persons are permitted to harvest oysters (*Crassostrea*), hard clams (*Mercenaria*), the Sunray Clam (*Macrocallista nimbosa*), Bay Scallop (*Argopecten irradians concentricus*) and Coquina (*Donax* species). Be aware that there are bag limits, size limits, seasonal "red tide" and excessive bacterial count warnings given at various times. There is available a series of current maps showing approved areas, conditionally approved area, restricted areas, prohibited areas (due to excessive pollution - Sanibel's inner bay shores, for example) and unclassified (not permitted pending bacterial and sanitary surveys).
3) Few people, and possibly some few of the Sanibel drafters of these new rules, realize the entire gulf shore of Sanibel and Captiva are in an unclassified area, which means you cannot legally harvest for food any live coquinas or hard clams from these barrier island shores. Presumably you can collect live coquinas, if you can prove you are not using them for food, but rather for making shellcraft items or for your shell collection. Here again, the Sanibel enforcement officers will have to use their judgment.

(We appreciate Dr. Abbott's making this new law known to us - now we must obey.)

A Natural History of Shells by Geerat J. Vermeij. 1993. Princeton University Press. 207 pp. 109 b/w illustrations, 22 color illustrations. 6¼" x 9¼". $30.00.

Most shell collectors tend to specialize in one or a few families of molluscs, and tend to look at shells in terms of distinguishing, for example, one species of cone from similar species. You may be aware of geographic restrictions of species, and possibly even have a general idea of what this species eats. But you avoid biological studies because you are not really interested in the squishy stuff inside the shell. There are, however, some biological studies that will entice the most specialized collector. Have you ever considered why cone shells have conical shells? How are the shells made? What are the advantages of this shape? Disadvantages? Why are there so many species from some areas, and very few from others? Why are there no cones in cold-water areas? When did the first cone appear in the fossil record? How did the community of shells vary through time, and why? These are the sorts of questions this book introduces you to, giving examples from all the shelled molluscs.

Perhaps Vermeij looks at shells from many different points of view because he must use his fingers to "see". Blindsince his childhood in Holland, he combines a fascination with shells with a brilliant ability to find answers to many of the questions zoologists are now asking about animals, using shells to find the answers.

Vermeij takes us on a personal journey, tracing his own growth as a biologist, looking at the questions he pursued. He gives us a broad overview of many questions and summarizes a few of the best studies surrounding each. The book is divided into three broad topics: 1) the rules of shell construction 2) life in a dangerous world - how shells live 3) the dimension of time. Each of these subjects is further divided, e. g. "the mechanics of shells" (in how shells live) covers life for shell-bearing molluscs on the upper shore, in waves and currents, as swimmers or floaters, on sand or mud, and as burrowers. Each section explains how shells are adapted to the multitude of conflicting requirements in each case.

People with only a casual interest in shells can become swept up in the author's enthusiasm.Collectors of shells will take a more keen interest in their specialties, and will start to see all shells in new ways. Perhaps they may even arrange their shells environmentally, or geographically. Readers with a scientific background but lacking the leisure to keep up with the scientific literature will enjoy the wide diversity of studies summarized by the author, with annotated bibliographies to entice you into greater depth. All readers will gain an appreciation for the many environmental facts which helped to shape shells. Vermeij introduces the reader to the long history of the evolution of shells, showing how changes in the environment over time are reflected in mollusc communities. His demonstration of how competition and predation have both accelerated evolutionary changes are especially valuable and an important contribution to our understanding of evolution.

This book is very well written and organized. The illustrations of shells (including 13 plates in full color) are excellent. A good collector's book of shells would be useful for the few genera mentioned but not illustrated. I felt that a few more diagrams would be helpful, but these were probably left out as being "too scientific" and therefore not for the general audience. However, the precise language carefully paints detailed pictures for the reader, so you won't miss anything.

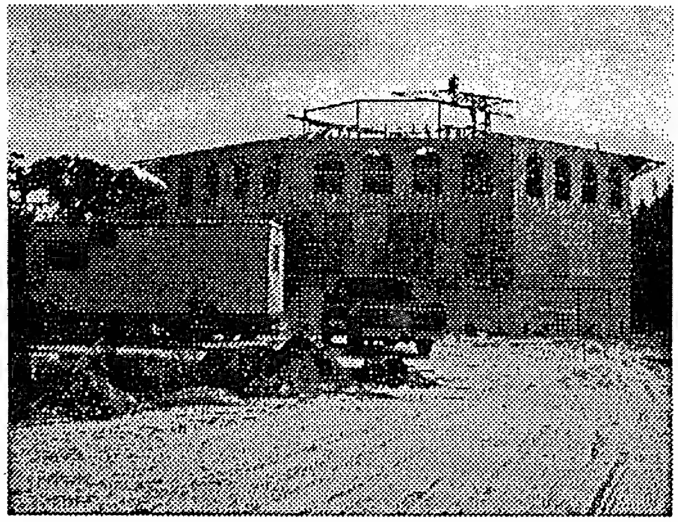
Anyone who collects shells and anyone interested in biology or natural history will probably enjoy this book. If you only fall in one category, after reading this book, you will probably want to belong to both!

by Allen Aigen

This book and many others can be purchased from Mal de Mer Enterprises, Bob and Dottie Janowsky, P. O. Box 482, West Hempstead, NY 11552-0482.

SHELL MUSEUM UNDER CONSTRUCTION

by Bill Hallstead



Bailey-Matthews Shell Museum rises from the sand. This west elevation, photographed in early October, shows the exhibit hall side. The octagonal framework on top is the support for the cupola that will feature stained glass windows.

The long-awaited Bailey-Matthews Shell Museum is under construction on Sanibel Island, Florida. After years of effort to comply with federal, state, county, and city requirements, we began erection of the building in early summer with installation of its foundation: concrete pilings to meet flood zone requirements.

The 10,000 square-foot ground level space will be available for limited uses. The main floor will house the 72-foot diameter exhibit hall, a 150-seat auditorium, the museum shop, and offices. The top floor will contain a 6,000+ volume reference library, Shell Vision Bank of 20,000 35mm slides, and the reference shell collection.

Though the project has raised more than $1 million, additional funding is sought for completion of exhibit fabrication and current operation of the museum's Preview Center. The need for additional funding has been necessitated, in part, by the city's requirement for the $85,000 bridge at the site's entrance, newly imposed septic system requirements which quintupled the originally anticipated cost, and unexpectedly high site clearance costs.

A recent boost came from Japan, a $10,000 grant by the Sumitomo Corporation. Earlier, the State of Florida assured building construction completion with a $241,133 award from the state's Cultural Facilities Program. For information on gifts, call Tucker Abbott at (813) 395-2233. Also of significant financial help is membership income. With the museum to open in early 1995, memberships carry the privilege of free access. The general admission is expected to be $3.00.

The museum Preview Center will be displaying the Fiji Collection of Raymond Burr, and will also be constructing a Raymond Burr Memorial Circle at the museum. Raymond Burr fans may personally express their affection for this great man by giving a $100 brick to the project. (Shell Museum, P.O. Box 1580, Sanibel Island, FL 33957)

1995 WINTER & SPRING SHELL SHOWS & OTHER EVENTS

by DONALD DAN, COA Awards Chairman

Jan. 14-22 **Oregon Shell Show, Portland, OR**
Maxine Hale, 347 N.E. 136 Ave.
Portland, OR 97230 (313) 747-2193

Jan. 21-22 **Astronaut Trail Shell Show, Melbourne, FL**
Jim & Bobbi Cordy, 385 Needle Blvd.
Merritt Is., FL 32953 (407) 452-5736

Jan. 27-28 **Greater Miami Shell Show, N. Miami, FL**
Norris McElya, 905 N.W. 15th Ave.
Miami, FL 33125-3625(305) 642-1504

Feb. 3-5 **Broward Shell Show, Pompano Beach, FL**
John Chessler, 7401 S.W. 7th St.
Plantation, FL 33317(305) 791-5909

Feb. 4-5 **V IIémes Recontres Internalonales du Coquillage, Paris, France**
Gilbert Jaux, 3 rue Saint-Honore
78000 Versailles, France (1) 39-53-80-46

Feb. 10-12 **Ft. Myers Festival of Shells, Ft. Myers, FL**
Anna Marie Nyquist, 18372 Cutlass Drive
Ft. Myers Beach, FL 33931 (813) 466-6391

Feb. 17-19 **Sarasota Shell Show, Sarasota, FL**
Peggy Williams, P.O. Box 575
Tallevast, FL 34270 (813) 355-2291

Feb. 24-26 **Naples Shell Show, Naples, FL**
Gary Schmelz, 5575 12th Ave. S.W.
Naples, FL 33999 (813) 455-4984

Mar. 2-5 **Sanibel Shell Show, Sanibel, FL**
Georgette Laforet, 1119 Periwinkle Way #176
Sanibel, FL 33957(813) 472-6290

Mar. 9-11 **Marco Is. Shell Club Show XII, Marco Is., FL**
John Maerker, 365 Henderson Court
Marco Island, FL 33937 (813) 394-3438

Mar. 17-19 **St. Petersburg Shell Show, Treasure Is., FL**
Bob & Betty Lipe, 440 75th Avenue
St. Petersburg Beach, FL 33706 (813) 360-0586

Mar. 17-19 **Treasure Coast Shell Show, Stuart, FL**
Mrs. Cathy Fry, 1542 Jupiter Cove Dr., Apt 502
Jupiter, FL 33469(407) 744-2502

Mar. 31 - Apr. 2 **Georgia Shell Show, Atlanta, GA**
Mr. John Cramer, 3537 Peppermint Court
(Tent.) Tucker, GA 30084 (404) 934-7143

May 7 **Pacific Shell Club Show, San Pedro, CA**
Frank Jewett, 1739 Vallecito Drive
San Pedro, CA 90732 (310) 514-8012

May 6-7 **Fifth Belgium International Shell Show, Aarschot, Belgium**
R. De Roover, Vorsterslaan 7
2180 Ekeren-Donk, Belgium(3) 644-3429

Jun. 8-12 **American Malacological Union Annual Meeting, Hilo, Hawaii**
Dr. Alison Kay, University of Hawaii
2538 The Mall, Honolulu, HI 96822 (808) 956-8620

Jun. 17-18 **XIVéme Salon International du Coquillage, Lutry, Switzerland**
Dr. Ted W. Baer
CH-1602 La Croix, Switzerland (21) 393771 or 207371

Jun. 23-29 **Conchologists of America Annual Convention, San Diego, CA**
Don Pisor, 10373 El Honcho Place
San Diego, CA 92124 (619) 234-0249

2620 Lou Anne Court, W. Friendship, MD 21794, U.S.A. Tel. (410) 442-1242 or 442-1942

PUBLICATIONS ON FOSSIL MOLLUSKS

The State of Mississippi

Mississippi has a rich geological history; it is a state reclaimed, as it were, from the sea and it lies within the Gulf Coastal Plain Physiographic Province. Mississippi boasts, among numerous other fine fossil beds, North America's best preserved lower Oligocene molluscan fauna and the best preserved Campanian fauna known anywhere.

These Mississippi fossils are well documented in a series of beautifully illustrated publications from the Mississippi Office of Geology, Department of Environmental Quality. Written by David T. Dockery, III, Division Director of Surface Geology, or by Dr. Dockery in conjunction with other authors, these exceptionally fine publications are enough to send any mollusk fossil hound on a dead run to Mississippi, geology hammer in hand. (For a complete listing of the Mississippi Office of Geology's publications, including topo maps, or to purchase any of the works discussed below, write to that office.at P.O. Box 20307, Jackson, MS 39289-1307) All of these guides are written with a friendly awareness of the needs of the amateur as well as those of the professional.

Bulletin 120, **Mollusca of the Moody's Branch Formation, Mississippi** (1977), by David T. Dockery, III. The late Eocene molluscan fauna of this area are photographed under UV light to show the relic color patterns. Bulletin 120 is out of print but available in many libraries. 212 p., 10 figs., 28 plates, 490 illustrations.

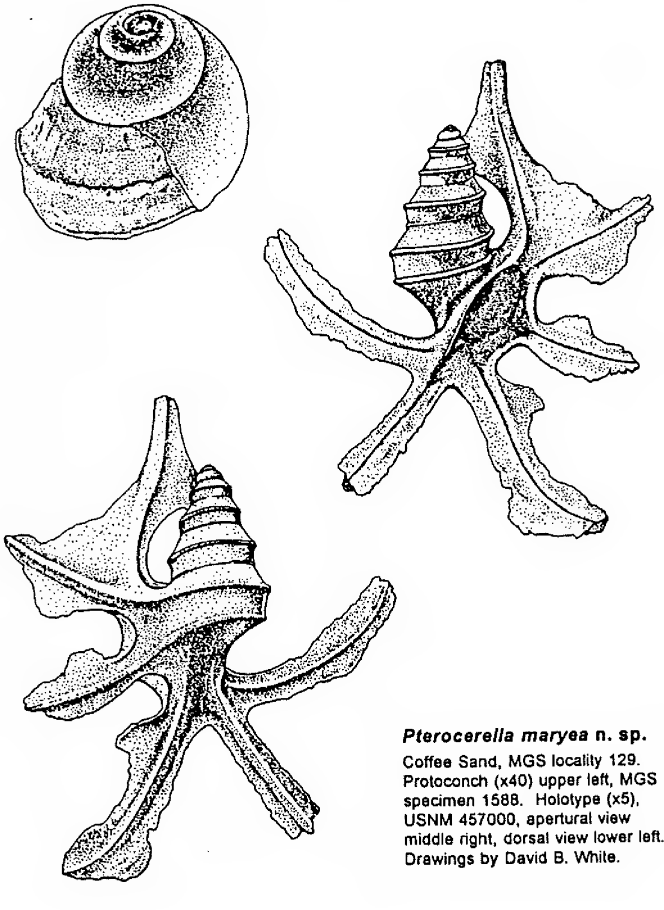
Bulletin 122, **The Invertebrate Macropaleontology of the Clarke County, Mississippi, Area** (1980), also by David Dockery, is a general survey of an area around Meridian which contains the state's Eocene localities and some Oligocene ones. Most of the fossils are molluscs and they are beautifully illustrated in some very fine photographs. 347 species, subspecies and variations are illustrated, including some Eocene ovulids and two *Conus* species. There are many bivalves shown, including 14 pectens and an improbably-looking oyster, *Gryphaeostrea plicatella* (Morton, 1833), thirteen volumes, a lovely *Pseudoliva*, and a host of attractive turrids. The cost is $4.00. 387 p., 36 figs., 82 plates.

Bulletin 123 (1982), **Lower Oligocene Bivalvia of the Vicksburg Group in Mississippi** by David Dockery, includes 144 species and names 45 new species. In this guide, the species are often illustrated using a number of specimens and views, so that the collector acquires a familiarity with the appearance of the species as a whole, and not just that of a single specimen. Venerids and Arcidae abound, and there are eleven pectens and three spondylids. Included in Appendix 1 are 12 previously unpublished plates from Leseur (1829) and, in Appendix 2, 3 plates from Conrad (1848), of the fossils in the Vicksburg group, including a number of gastropods. The cost is $9.00. 261 p., 49 figs., 62 plates + 15 plates in the appendices.

Bulletin 124 by F. Stearns MacNeil and David Dockery covers **Lower Oligocene Gastropoda, Scaphopoda and Cephalopoda of the Vicksburg Group in Mississippi** (1984) is a companion to Bulletin 123. This publication discusses and illustrates 411 species, subspecies and varieties, and it describes 189 new species and subspecies. Outstanding coverage is given to the turrids, with a whopping 86 species included. Again, the illustrations are fine and sharp and clear and illustrate a variety of specimens and views in most cases. The cost is $10.00. 415 p., 16 figs., 72 plates.

Bulletin 129 by David Dockery is **The Streptoneuran Gastropods, Exclusive of the Stenoglossa, of the Coffee Sand (Campanian) of Northeastern Mississippi** (1993). Abundantly supplied with crisp, clear photos, this publication on the fauna of the Upper Cretaceous deposits of Lee County, Mississippi illustrates some of the best preserved gastropods of their ages known anywhere. Many beautiful and strange species of the Apporhaiidae (12 species in nine genera) once lived in this shallow, in-shore shelf environment; one of them, a new species, *Pterocerella maryea,* graces the book's cover. This publication is a modification and expansion of the author's 1991 doctoral dissertation. It covers 100 species of gastropods. The cost is $15.00. 191 p., 10 figs., 42 plates.

Another publication, this one by Earl M. Manning and David Dockery, is Circular 4 (1992), **A Guide to Frankstown Vertebrate Fossil Locality (Upper Cretaceous), Prentiss County, Mississippi.** Developed from a handbook for high school geology students, it is aimed at hobbyists and secondary students, and a great deal of basic geology is contained therein. The Frankstown locality is composed mostly of vertebrate remains, but among them are abundant fossil shark teeth, always of interest to fossil collectors. The cost is $4.00. 43 p., 7 figs., 1 table, 12 plates. All prices will have $1.50 added for postage and handling, and .50 per additional copy (or volume?).



***Pterocerella maryea* n. sp.**
Coffee Sand, MGS locality 129. Protoconch (x40) upper left, MGS specimen 1588. Holotype (x5), USNM 457000, apertural view middle right, dorsal view lower left. Drawings by David B. White.

REVIEW

ARCHITECTONICIDAE OF THE INDO-PACIFIC (Mollusca, Gastropoda) by Rüdiger Bieler. 1993. 376 pages, 286 figures, 3 plates 6 3/4 X 9 5/8", softbound. Gustav Fischer Verlag, Stuttgart, Germany. About $100 U.S.

In all honesty, Rudiger Bieler's monograph, **Architectonicidae of the Indo-Pacific**. is not a book for everyone. Among collectors, only those who specialize or have an otherwise strong interest in the elegant sundials, along with some flagrant and unregenerate book buyers, are likely to spend the approximately $100 that this softbound book costs. That said (up front — a book's high cost is likely the first concern hobbyists express) we can put the matter behind us and get on with a more fruitful look at this really fine work. It is a superb example of the genre, a systematic monograph at its very best.

Dedicated to an outstanding malacologist, Richard S. Houbrick, and written by another, Dr. Bieler's revision of the Architectonicidae (Order Heterostropha) is based on new field studies, on all available original publications and type material, and on examination (personal in most cases, photographic only where necessity dictated) of more than 22,000 specimens in over 50 collections worldwide, many of which he visited. It is a product of a careful attention to detail, of long and excellent research, study and field work, and of a dedication to providing every aid and convenience possible to the reader. An outgrowth of his research for his PhD. thesis at the University of Hamburg, it is the result of ten years' work.

Architectonicids are planktotrophic, spending a long veliger stage dispersing through warm-temperate to tropical regions. They are also the only family to possess sinistral-coiling protoconch and dextral teleoconch. Dr. Bieler has done much work on their protoconch and teleoconch shells and has determined the shell of this early stage to be of great importance in identification. His detailed descriptions of the recognized taxa, as well as the 470 SEM and light photographs, place special emphasis on this aspect of shell anatomy. A combination of sculpture, shape and color of the early whorls is used to distinguish among species. Radula and protoconch are more important at the generic level. Maps, graphs and drawings and summarized information on distribution, ecology, development, anatomy and reproduction round out each species discussion. (A study of the information on habitat and feeding behavior will bring a gleam to the eye of the self-collector!)

The family is hereby arranged in 11 genera, and of the 250 previously introduced taxa discussed, 88 are considered valid; twenty species are described as new to science, while eight more unnamed "forms" need further study. The large, crisp and clear photos accompanying the descriptions make for much easier identification of the species in our collections than was formerly possible. The introductory material wherein are discussed such topics as the shell and operculum, anatomy and biology, zoogeography, and the fossil record, is exceptionally clearly written, and malacological jargon, which makes many such works unreadable to any amateur but the most advanced, is held to a minimum. Reading it is an edifying pleasure.

Architectonicidae of the Indo-Pacific is concluded by a lengthy and most impressive list of acknowledgements (in themselves almost a map of Dr. Bieler's ten-year study), a taxon index and a nearly 800-title bibliography. What a really nice piece of work it is! (A COA grant allowed the publication of one of the three color plates, a contribution from which we can derive much satisfaction!)

This review isn't going to conclude by saying, "Rush right out and buy your copy!" — either you want it or you don't — or even by saying that it will be a necessary part of every serious conchologist's library — of course it will. Instead, it urges you to get a look at it if you can. Sample a bit. Taste the prose and peruse the photos. Read the Introduction, and perhaps Section B containing his text conventions. You'll discover for yourself what a really exceptional revision of an intriguing family it is. And you just may find you want to own the book. You might even start collecting Sundials. —*LS*

GRAND THEFT AT SWISS SHELL SHOW

by Donald Dan

During the night, thieves broke into the premises of the 13th International Shell Show in Lutry, Switzerland and stole specimen shells to the value of US $350,000. The thieves gained admission through a utility room window near the school auditorium where the show was being held. Upon discovery of the theft, the local police made an exhaustive effort to recover fingerprints. Recently, there have been several serious break-ins and thefts of shells in Italy; possible connection between the Swiss incident and the Italian thefts is being investigated.

Twenty-one dealers have reported their losses to the police for the total of $350,000. That figure is likely to be revised as more is known. Several dealers have not reported their losses yet. Also, some dealers based their loss estimates on retail value, while others reported values on the basis of cost. Thus the revised loss estimate should go much higher.

The annual Swiss shell show has been one of the most popular events of its kind in Europe. It has always drawn a cosmopolitan mix of dealers and collectors from all over the world. Large numbers of rare shells were displayed, many in a very casual manner. Switzerland, being a low crime nation, made most dealers feel at ease and they took minimum precaution. The majority of the losses consisted of the rarest of the displayed shells, including *Cypraea leucodon, Entemnotrochus rumphii, Lyria lyraeformis,* numerous Australian *Zoila* species, and many rostrate and niger cowries from New Caledonia. The criminals apparently knew very well what shells to take.

All shell collectors and dealers should be alerted to stolen shells which could eventually come on the market. Thefts at COA's Bourse a few years ago and at the Georgia shell show have made us all wary. This grand theft in Switzerland confirms our suspicions that the shell world is not exempt from an escalating crime rate. Should such incidents continue, we could one day see a need to establish a centralized procedure to report suspicious activity or trafficking in stolen shells.

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Corresponding member, $7.00 per year in the United States
Overseas membership, $9.00 per year paid in U.S. currency

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SCHEDULE OF MEETINGS

1994 - 1995

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PROGRAM SCHEDULE

SUNDAY, March 12, 1995	2:00 p.m. "VARIATIONS IN CONE SPECIES" by Rich Kelly
SUNDAY, April 9, 1995	1.00 p.m. ANNUAL NYSC AUCTION AND SOCIAL Mel Springer, Auctioneer; viewing of auction items from 11 a.m. to 1 p.m. See page 3, this issue, for details; auction list and directions will be mailed.
SUNDAY, May 14, 1995	2:00 p.m. "GALAPAGOS ISLANDS" by Maxwell (Mickey) Cohen Nominations for office, 1995-6 for NYSC
SUNDAY, June 11, 1995	2:00 p.m. "SHELLING IN THE PHILLIPINES" by Mel and Sylvia Springer Election of 1995-6 NYSC officers

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Since NYSC NOTES - clearly! - does not employ a staff of reporters, contributions of articles, information, etc. about shells and shelling are most welcome. Please send to NYSC, Theta Lourbacos, 66 W. 94 St. Apt.20C, New York, NY 10025. We look forward to hearing from you.

HIGHLIGHTS OF RECENT MEETINGS

December 11, 1994. Program Chairman Al Scarpetti suggested that members bring shells for display and comment to the February meeting. Setting an example, he had on display several fine specimens of Conus cedo-nulli, aurantius and granarius from his extensive cone collection.

The speaker was Hank Foglino, of the Long Island Shell Club, whose subjects were "Sound in the Sea" and "Tides." His far-reaching knowledge of both was acquired through his work at Grumman, which not only manufactures aircraft, but has done extensive research and development work on detection systems. Enemy submarines and edible fish are the chief quarry, and the obstacles that frequently confound the sensors are many and varied. Conflicting sounds may come not only from ships and marine animals but waves, grinding ice and other sources. During World War II, for example, it was found that waves of 2 or 3 feet and higher made submarine detection very difficult. Also, the Germans learned to hide in the din set up by beds of snapping shrimp. Determination of direction is often skewed by the refraction of sound that occurs as sound passes through zones of differing temperature or salinity.

Hank opened his discussion of tides by noting that this phenomenon isn't mentioned in early recorded history, or in the Bible. The fact that there are no tides in the Mediterranean must be one of the reasons. Noting that the sun's effect on tides is four-ninths that of the moon, he explained the alignments that produce the highest and lowest tides, and the greatest and smallest differentials between successive highs and lows.

Nick Katsaras displayed three specimens of Conus figulinus, all fine, and one measuring 103 mm. The record is 121 mm.

The door prizes were a pair of Cyrtopleura costata, won by Hank; Placostylus alexander, won by Dan Jacobs; and Oliva reticulata, won by ?

January 8, 1995. An informal meeting was held, at the invitation of Fred Cannon, in his home in downtown Brooklyn. It was a delight, as always, to get another look at his spectacular collection and his magnificent Christmas decorations, most of them antiques. The largest of his four Yule trees was strung with 2,000 lights and many more thousands (!) of ornaments. Members of the Long Island Shell Club were among those who enjoyed the day.

February 12, 1995. Volunteers for the work of preparing shells for the April auction decided on the morning of February 27 as the time for their first work session. Visitors Yumiko Iwasaki and Charles Whitman were introduced, the latter as a new member.

Shell-of-the-Month presentations were made by Carl Ehrlich, who displayed a Murex eburnea; Henry Gordon, who described the purchase of a Conus textilis in San Francisco, and Al Scarpetti, whose subject was several Conus.

Arlene Reiman, too, had a San Francisco story, Small-World Division. In a shell shop there she heard another customer ask the sales clerk for information about shell clubs. Arlene approached him and mentioned Conchologists of America. The man, an Indonesian, then asked if she might happen to know the Janowskys, because he was scheduled to meet them the following day. Very small, sometimes.

Upon the late arrival of the recording secretary, the minutes of the December meeting were read and accepted.

The program was the presentation of a video tape made by Richard Goldberg, the first edition in his series "Focus on Conchology." The first of its three subjects is the causes for the gradual disappearance of Hawaii's terrestrial snails. There is particular pressure on certain species and families, but the outlook for all the state's land snails is bleak.

Part Two is an interview with Robert daMotta, whose special interest isConus. Despite his years of fascination with this family, he does not do any collecting.

With George Davis as host, the tape then outlines the history of the Academy of Natural Sciences in Philadelphia. George, who is chairman of the Department of Malacology, follows a long line of distinguished malacologists who illuminate the Academy's history. Its shell collection, which includes an impressive number of type specimens, is second only to the Smithsonian's in size.

Included as vignettes are a review of Powell's "New Zealand Mollusca" and a look at the Long Island Shell Club.

The door prizes were Xenophora peronianus, won by Romuald Czepulkowski: Acavus haemostoma, won by Carl Ehrlich, and Murex ramosus, won by Charles Whitman.

COMING ATTRACTIONS

April 9, 1995: NYSC Annual Auction and Social. This year's Auction and Social will be held again at Dorothy Jensen's Broadway Dance Studio, 31-08 Broadway, Astoria, Queens. We welcome all donations of specimen shells, shell books, and shell-related items. In addition to donations previously reported from Leon Juster and Bob and Dottie Janowsky, many more are needed to make this a successful fund drive. Members' dues contribute to the cost of routine operations and publication of NYSC NOTES, but funds raised by the auction are of greatest importance in maintaining our activities.

Volunteers are also needed to provide refreshments and help before and during the auction. Arrangements will be discussed at the March NYSC meeting, and contributions for the auction will be accepted then.

A list of major auction items will be prepared and mailed to New York Area members in early April.

Thursday, March 23, 1995 - 6:30 p.m. Linder Theater, Am. Mus. Nat Hist. Lecturer Walter Sage presents "Environmental Impact on Shell Collectomg in the New York Area." ECO IMPACT FORUM. For additional information call (212) 769-5750

Wednesday, April 12, 1995 - 7:00 p.m. Kaufmann Theater, AMNH. Sidney Horenstein presents "Zebra Mussels: Alien Invaders"; he is the Museum's coordinator of environmental public programs. Admission is $6 for Members, $9 for non-Members.

PALEONTOLOGIST VIEWS EVOLUTION OF SHELL FORMS

Dr. Geerat Vermeij, a Dutch-born paleontologist who teaches at the University of California at Davis, has arrived at some interesting conclusions regarding the evolution of mollusks according to a recent feature article in the New York Times.* Dr. Vermeij (pronounced Ver-MAY), whose new book, A Natural History of Shells, was favorably reviewed in the December 1994 NOTES, has turned a disability (he is blind) into a unique asset in studying shell morphology.

Dr. Vermeij, who has done extensive field work in places such as Guam, Africa, New Zealand and Panama, has arrived at a unique view of evolution based on his two decades' observation of mollusks. His specialty is focusing on the role of predation in the formation and changes in shell types. By examining fossil shells, he determined that an ability to escape predators became an important survival skill. He also noticed that over long periods of time shells evolved better ways to protect themselves; they became more tightly coiled, and developed more teeth and smaller apertures. At the same time predators such as crabs and fish became more adept at killing them. He concludes, "It's anything but the romantic idea that nature is nice and kind and stable... it's nasty and things get nastier and nastier. Everyone is affected mostly by their enemies."

By seeing shells in a way that others do not, Dr. Vermeij has forced paleontologists to reconsider how animals shape each other's evolutionary fate. By studying the relationship of shells and their environment, he has helped to establish the new field of paleoecology.

by Lawrence G. Potter

*"Getting the Feel of a Long Ago Arms Race", by Carol Kaesuk Yoon, New York Times, February 7, 1995

DEEP-SEA SPONGE REACHES OUT, DEVOURS

SCIENCE NEWS, in its February 4, 1995 issue, reports on a newly identified sponge which has developed filaments to capture small crustaceans. In the Jan. 26 NATURE, Jean Vacelet and Nicole Boury-Esnault of the Universite d' Aix-Marseille II discovered a sponge that evolved some unique characteristics, minute, hook-shaped, pointy structures called spicules cover the movable filaments, and tiny crustaceans get trapped on the spicules. New filaments grow over the prey, covering it completely in a day, and within a few days the sponge digests its catch. As yet unnamed, the sponge belongs to the genus Asbestopluma, which normally resides in the North Pacific and North Atlantic at least 100 meters below sea level; members of this genus live as far down as 8,840 meters. However, this specimen was found 17 meters below sea level in a Mediterranean cave, cold, dark, and limited nutrients, possibly resembling deep sea conditions.

Normal sponges are filter feeders, but the new sponge without the filtering system would indicate that the definition of the phylum is now inadequate.

from article by T. Adler

Mollusks of the Indian River Lagoon, FLORIDA

Paula M. Mikkelsen
Harbor Branch Oceangraphic Museum
Ft. Pierce

Last year, I spoke to the shell club about a new project assessing the molluscan fauna of the Indian River Lagoonal System, past and present, from Ponce de Leon Inlet in the north to Jupiter Inlet in the South. The results were presented at a Conference on Biodiversity of the IRL at Harbor Branch in February 1994, and I have just completed the final draft for the *Bulletin of Marine Science.* The paper, coauthored with Paul S. Mikkelsen and David J. Karlen, will be part of a special issue of *BMS* to be published next January. I will send a reprint for the club library after publication, but thought it appropriate now to let you know the results of this study.

We began, of course, with a literature survey. Published papers revealed 116 species; another 143 species were listed by informal shell club publications, theses and reports, including a preliminary checklist compiled by Paul in 1981. The total number of previously recorded species was thus 259.

Additional sources were many and varied: The Harbor Branch Museum collections, our private collection (now partly in the Delaware Museum of Natural History) and field notes, personal communication with colleagues and other collectors, and (as you well know) members of local shell clubs such as ATSC and the Treasure Coast Shell Club in Stuart.

The most significant addition was a 1979 Indian River Survey, carried out by Paul and his co-workers at Harbor Branch's former Benthic Ecology Department and specifically designed to sample IRL crustaceans and mollusks. This consisted of 709 samples taken over a calendar year during six sampling periods. Collections were made in supra-, inter- and subtidal habitats including mud, sand, rocks, mangrove roots, emergent vegetations, drift and benthic algae, seagrasses, and the intercoastal channel. Due to time limitations, only 172 samples from two of the sampling periods were used for this survey.

4,503 records from 1,150 stations resulted in a total of 428 species. 361 species were live-collected and 65 were collected only as empty shells. 130 families were present, and with 259 genera. The most diverse families were Pyramidellidae (23 species), Veneridae (18), Tellinidae (16) and Teredinidae (14); 52 families contained single species. The tiny cerith-like snail, *Bittiolum varium,* was the most frequently collected species with the highest number of records (110). This species was also the most abundant with the highest density recorded a 7,627 individuals/m2 in one June seagrass sample. *Bittiolum* was followed by the mussel *Brachidontes exustus* (102 records, the mud snail *Nassarius vibex* (100), and one of my favorite bubble-snails *Acteocina canaliculata* (96). Seven other species were numerically abundant, exceeding 500 individuals/sample: *Acteocina canaliculata, Batillaria minima, Brachidontes exustus, Caecum pulchellum, Ilyanassa obsoleta, Parastarte triquestra* and *Petaloconchus varians.*

The IRL harbors no endangered or threatened mollusks. However, the queen conch *Strombus gigas* has been recorded in small numbers in the Indian River and Hobe Sound. This species has been over-exploited for human consumption and ornamental use throughout its range and is now classified as "commercially threatened." In 1986, it became illegal under Florida state law to collect *S. gigas* in all state and federal waters, including the IRL.

Two species are commerically exploited in the IRL, the oyster *Crassostrea virginica* and the hard-shelled clam *Merceneria mercenaria.*, The IRL is also used extensively as nursery grounds for local mariculture of clams.

Five species (one opisthobranch, *Phyllaplysia smaragda,* and four "yoyo" clams, *Divariscintilla luteocrinita, D. octotentaculata, D. troglodytes,* and *D. yoyo)* are endemic to the IRL system, meaning that they live no-where else on earth. The opisthobranch may already be extinct; it was described in 1977 from the northern IRL in seagrass beds which are now gone. The four "yoyo" clams are habitat specialists, dependent upon a burrowing mantis shrimp for survival. Because they are "obligate commensals" with the shrimp, they cannot survive independently, and are further vulnerable because their main population is concentrated on sand flats surrounding the Ft. Pierce Inlet, targeted lately for port expansion.

Two introduced species have been recorded, both probably arriving via ship traffic. The Californian opisthobranch *Ercolania fuscovittata* was collected from a channel marker at Titusville and from the Sebastian Inlet jetty. The Indo-Pacific shipworm *Lyrodus mediolobatus* was collected at two localities, Ft. Pierce Inlet and St. Lucie Inlet. Neither has established a viable population.

14 new distributional records were recorded, 3 from the Florida Gulf coast, 8 from northern localities, and 3 from southern zones. Most of these are nudibranchs or other opisthobranchs, recorded largely through the research of Dr. Kerry B. Clark at Florida Tech.

For purposes of analysis, we divided the lagoon into 7 regions: A = Mosquito Lagoon (including Ponce de Leon Inlet); B = northern Indian River (Turnbull Creek to Eau Gallie); C = Banana River; D = north-central Indian River (Eau Gallie to Sebastian Inlet); E = south-central Indian River (Sebastian to Ft. Pierce Inlet); F = southern Indian River (Ft. Pierce to St. Lucie Inlet; and G = Hobe Sound/Jupiter Sound (St. Lucie to Jupiter Inlet).

Regions D and E included the most stations (628), largely due to where Paul and I lived and worked over the years. Mosquito Lagoon was the most poorly sampled (7 stations). The individual locations most frequently sampled were Sebastian Inlet (204 records), Banana River (192, thanks largely to the 1993 efforts of ATSC's Mario Krisberg), Link Port near Harbor Branch (160), Ft. Pierce Inlet (126), and St. Lucie Inlet (101). Over 60% of all species were found in only one or two regions; 4 species (*Brachidontes exustus, Crassostrea virginica, Mercenaria mercenaria, Mulinia lateralis)* were found in 7 regions. Because of the source of our material, most of our samples were a bit dated, collected during the years 1974-1982.

While 39 species could be considered common through the IRL, our analysis defined 4 areas with distinct molluscan components. These (listed with their typical mollusks) were: Mosquito Lagoon (region A, with the mud-snail *Ilyanassa obsoleta),* northern Indian River + Banana River (B + C, with the tulip shell *Fasciolaria hunteria),* central + southern Indian River (D +E+F, with the nerite *Nerita fulgurans* and the moon snail *Polinices duplicatus),* and Hobe Sound (G, with more tropical species like the amber pen-shell (*Pinna carnea).*

Of the habitats recorded, seagrass supported the greatest number of live species (177), followed closely by sand, rock and mud. 106 live-collected species were found only at inlets (including the four endemic yoyo clams) characterized by oceanic salinites. Most shell collectors subjectively know this,that the mollusks at an inlet are "different" from those in more lagoonal sites. Our study confirmed this by showing that a "species-similarity index" was significantly lower between Sebastian Inlet and other non-inlet sites within its region, than between the various non-inlet sites.

Finally, we compared the IRL with other well-studied western Atlantic estuaries: Tampa Bay, Florida Bay, Biscayne Bay, Chesapeake Bay (northeastern U.S.) and Nichupte Lagoon (Mexico). The IRL included significantly more species than any other, and showed strongest species similarity to Tampa Bay which lies at about the same latitude. This high biodiversity confirms the idea of a "zoogeographic transition zone" in this area, caused by the overlap of the temperate Carolinian and tropical Caribbean provinces.

The data provided by our survey are less than ideal. The collections were unevenly distributed throughout the lagoon, largely concentrated in the central IRL. Furthermore, many of our collections were made more than 10 years. In spite of these shortcomings, we created an important historical record against which future investigations can be compared. One of the goals of the Biodiversity Conference was to provide those officials charged with drafting a Management Plan for the IRL with data to suggest areas for conservation. Like many others at the meeting, our study pointed out the importance of inlets and seagrass beds, and also noted endemic, protected and commercial species among the mollusks which require special consideration by the planners.

ATSC members were extremely helpful in contributing to the species list. Records from Tom Stewart, Eleanor Hillman and Pearl Shank added many unusual finds at frequented field trip sites, some of these the only occurrences on record. I must also thank Mario Krisberg who generously provided records of almost-daily collections from the Banana River area, including the estuarine waters surrounding Kennedy Space Center (which required special permits). In general, this paper was a tremendous cooperative effort over many years, and I thank you all for your help and interest. I apologize for not reporting this to you in person, but time has gotten away from me (as explained below).

As a final note, some of you have already heard that I am soon moving away from Florida, my second home for the past 20 years. Beginning in October, I will become Assistant Curator of Mollusks at the Delaware Museum of Natural History in Wilmington. There I must fill two sets of impressive shoes, those of my friends and predecessors, Dr.. R. Tucker Abbott and Rudiger Bieler. I will also be finishing up my Ph.D. degree at Florida Tech just before I depart. A tremendous year indeed! But I will always remember the good friends I made at ATSC and how awe-struck, delighted and inspired I felt at my first club meeting back in March 1975. ATSC was instrumental in turning my hobby into a career, and I will always be grateful for that. Please come and visit me - I promise you a grand tour of one of the great east-coast museums!

After October 15, my new address will be: Department of Malacology, Delaware Museum of Natural History, Box 3937, Wilmington DE 19807-0937, Tel. 302-658-9111.

Note: Copies of the Species list for this article may be obtained from the editor.

(The Capsule - newsletter of The Astronaut Trail Shell Club - October 1994)

[We wish Paula Mikkelsen all the best as she takes over at the Delaware Museum]

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PROGRAM SCHEDULE

SUNDAY, June 11, 1995 2:00 PM "SHELLING IN THE PHILLIPINES"
by Mel and Sylvia Springer

Election of 1995-6 NYSC officers

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We understand Walter Sage has returned to the hospital for additional surgery - we send him our best wishes for continuing recovery.

HIGHLIGHTS OF RECENT MEETINGS

March 12, 1995. In preparation for the April auction meeting, Ed asked for volunteers to get tables and chairs set up in the Broadway Dance Studio on the day before the meeting, and to select shells to go on the auction list. Irv Hoppenwasser and Romuald Czepulkowski volunteered for work at the studio, and Ed, Al Scarpetti and Milton Werner for the selection job.

Romuald displayed and described an unusual specimen from his favorite family - the Turridae. His shell was an albino Turricula javana, (L. 1767). He said that many freak specimens from this and other families are being found off the southeast coast of India.

Larry Potter reported having received a call from a man who would like to start a shell dealership in Holbrook, on Long Island.

The door prizes were a Beguina suborbiculata, won by Harvey Frajlich; Murex negritus, won by Allen Aigen; Acavus waltoni, won by Irv Hoppenwasser. Visitor Deborah Yaffe was introduced to the members.

The speaker was Rich Kelly, whose subject was his second-favorite family - the cones. Slides showed a number of specimens from his collection, chosen partly for their beauty and partly because they illustrated the variability in color and pattern within species. A striking example was a series of textilis that showed the great range of variability found in this species. Rich noted that he doesn't recognize subgenera in working with this family.

The 433rd meeting of the New York Shell Club was an annual auction and social gathering, held on April 9, 1995 at Dorothy Jensen's Broadway Dance Studio, in Astoria, Queens. Attendance was 33 members and friends.

The most noteworthy shells that changed hands were:

Conus gauguini, $130
Voluta aulica, $50
Murex alabaster, $50
Voluta mamilla, $31
Conus betulinus, $26
Boreotrophon stewarti, $25
Siratus consuela, $23
Murex mactanensis, $21 and $20
Voluta sowerbyi, $20

Business at the bargain table was fast and furious - almost a sell-out. punch, wine, coffee,cake and coldcuts and crackers were available throughout the proceedings.

The raffle prizes were a copy of "The Encyclopedia of Shells," by Gary Rosenberg, and a copy of "Kingdom of the Seashell," by Dr. R. Tucker Abbott.

May 14, 1995. New member Mark Shapiro was introduced. Milton Werner was appointed chairman of the Nominating Committee.

Carl Ehrlich had on display a large array of shells he had collected during a recent trip to the Marquesas. He described the shelling there as great, but the diving difficult because of strong waves and currents and steep shorelines. His eight-day stay covered three islands.

The door prizes were a juvenile Charonia tritonis, won by Eli Horowitz; Murex cabriti, won by Mickey Cohen, and Amphidromus winteri, won by Marvin Cohen.

The speaker was Mickey Maxwell Cohen, who last addressed the Club in October, 1994. Mickey and his wife, Barbara, are co-managers of Bayswater Point State Park, New York. He also teaches at the New School for Social Research, where he has developed courses in The Wildlife of North America, The Sea, Whales and Man, The Natural History of the New York Area and The Galapagos Experience.

Mickey's subject was the Galapagos, to which he leads tours regularly. The water of this area is among the richest in the world in nutrients, and so cold that he wears a wet suit when he snorkels. The 13 islands and islets are of volcanic origin, and vulcanism is still bringing slow changes to the geography of the group. Some of his many slide photos showed the variety of forms taken by the lava as it cools. Other subjects were the local plant life, and tortoises, iguanas, sea lions, blue-footed boobies and their red-footed and masked cousins, frigate birds, albatross, flightless cormorants, Galapagos penguins and flamingoes. Mickey reported good shelling in the crater of a volcano that has sunk until only its crown is above water.

1995-6 PROPOSED SLATE OF OFFICERS AND DIRECTORS

President	Edward Cowles
Vice President	Lawrence Potter
Secretary	Milton Werner
Treasurer	Theta Lourbacos
Historian	Nick Katsaras
Directors	Walter Sage
	Allen Aigen
	Al Scarpetti

Additional nominations will be accepted from the floor at the June 11, 1995 meeting.

1995 SOCIAL/AUCTION - THANK YOU!

The NYSC 1995 Social/Auction in April was a big success - many fine shells and books were auctioned and the Club's treasury increased substantially. Many people contributed to making the affair a success, giving their time not only on Sunday, April 9, but many weeks before. They prepared the shells for the auction, made the auction list, prepared a big mailing, set up the bargain table, bought supplies for the refreshment table, and prepared the studio for the big event.

We thank the following for their contributions; please note the order in which people are listed is purely random and has no relation to the size or type of contribution. If anyone has been left out, please let us know - the omission was not intentional.

Dorothy Jensen
Mike Werner
Ed Cowles
Leon Juster
Mal de Mer Enterprises
Al Scarpetti
Nick Katsaras
Carl Ehrlich
Romuald Czepulkowski
Sylvia Springer
Mel Springer
Irv Hoppenwasser
Miques Molluscs
Specimen Shells Sales
Walter Sage
Phyllis Martignoni
Theta Lourbacos
Arline Reimann
Hans Reimann
Alan Aigen
Stella Ruddley
John Cole
Sol Weiss
Larry Potter
Henry Gordon

OFFICERS AND DIRECTORS
NEW YORK SHELL CLUB

COMING ATTRACTIONS * AUTUMN 1995 MEETINGS

Sunday, September 10, 1995 - "Shells of Walden Pond" and "Shells of Eagle Island, Maine"
slides and script by Christina Joyce

Sunday, October 8, 1995 - "Shelling on Long Island"
slides and script by Helen Madow, LISC

Sunday, November 12, 1995 - Member shell-exchange afternoon

1995 SUMMER & FALL SHELL SHOWS AND MEETINGS

DONALD DAN
2620 Lou Anne Court, W. Friendship, MD 21794
Tel. (410) 442-1242 or 442-1942

Jul.	8 -9	**Keppel Bay Shell Show** Yeppoon, Queensland, Australia Jean M. Offord, 277 McDougall St., N. Rockhampton, Qld. 4701, Australia	(79) 283-509
Jul.	14-16	**Jacksonville Shell Show** Atlantic Beach, Florida Judy Blocker, 102 Magnolia Street Neptune Beach, FL 32266	(904) 246-4012
Jul.	29-30	**Townsville Shell Show** Townsville, Queensland, Australia Glenda Rowse, 19 Farrell Street Kirwan 4814, Queensland, Australia	(77) 732-817
Aug.	17-19	**Jersey Cape Shell Show** Stone Harbor, New Jersey Jersey Cape Shell Club, P.O. Box 124 Stone Harbor, NJ 08247	(609) 653-8017
Sept.	8-10	**Cairns Shell Show** Cairns, Qld., Australia Babara Collins, House of Ten Thousand Shells 32-34 Abbott St., Cairns 4870 Queensland, Australia	(70) 51-3638
Sept.	16-17	**Central Florida Shell Show** Orlando, Florida Helen Kwiat, 1329 Sterling Oaks Casselberry, FL 32707	(407) 695-3887

Sept. 16-17 **International Shells & Fossils Bourse**
Ottmarsheim, France
Michel Rioual, 2 Rue des Vergers
68490 Ottmarsheim, France 89-26-16-43

Oct. 6 - 8 **Annual German Shell Fair**
Kircheim Teck, Germany
Edmond Trippner, Im Dosjiler 19
73230 Kircheim Teck, Germany FAX (7153) 25-048

Oct. 28 **British Shell Collectors' Club Shell Show**
London, England
Kevin Brown, 12 Grainger Road
Isleworth, Middlesex TW7 6PQ, England (81) 568-8333

Nov. 4 - 5 **Gulf Coast Shell Show**
Panama City, Florida
Jim & Linda Brunner, P.O. Box 8186
Southport, FL 32409 (904) 265-5557

Nov. 10-12 **Philadelphia Shell Show**
Philadelphia, Pennsylvania
Al Schilling, 419 Linden Ave.
Glenside, PA 19038 (215) 886-5807

Nov. 17-19 **North Carolina Shell Show**
Wilmington, North Carolina
John Timmerman, 32 JEB Stuart Drive
Wilmington, NC 28412-1700 (910) 452-0943

BOOK REVIEW

"Marine Life of the North Atlantic: Canada to New England"

by Andrew J. Martinez and Richard A. Harlow

How many collectors, I wonder, have tried to identify a mollusk from observations made on live specimens in the field and none of the standard shell books show anything but dead specimens? This all too familiar problem would soon become a thing of the past if more books like this were available. An expertly photographed field guide to all variety of marine organisms, it is at once both useful and breathtaking.

Based in format on the marine photo-guides usually found for tropical areas like the Caribbean or Baja California, this book covers life under the sea from A[cadian hermit crabs] to Z[irfaea crispata] and all manner of algae and fish in between. These pictures prove that there is beauty under every sea, even one as cold as the North Atlantic! Each pair of opposing pages is set up with text on the left page and a photo illustration for every species on the right. The text includes sections on the all-important identification criteria, habitat, range, and a comments section that includes interesting trivia and tid-bits (common names, similar species, etc.). The photographs, especially for the mollusks, are vibrant and clear, showing details of the living animals close up. In addition, the photo pages contain a useful feature I have not seen before: data lines for entering dates and locations where the reader has seen the species in the wild.

The mollusk section is over 50 pages long, by far the largest section in the book, and is quite comprehensive for this geographic region. The four major classes are included, with the gastropods getting most of the attention. It is the pictures that immediately grab you here, and the photos of the nudibranchs are frankly spectacular, especially as many of them include the animals laying their species-characteristic egg masses. Perhaps the best feature is that the mollusks are photographed, for the most part, live in the field and not as dead shells arranged on a beach. This includes the bivalves, a group that has always been poorly illustrated in these types of books. Rounding out this edition, excellent pictures of cnidarians and echinoderms (especially the feeding sea cucumbers) show beauty in the sea beyond the mollusks.

There are a few problems, to be sure. The few pictures of dead mollusks are of rather ratty ones and although this might be a more accurate depiction of what the average person would find beachcombing, they look out of place here. A few typographical errors occur, the most glaring being the "bivalves" heading on the cephalopod pages and since the authors give some synonyms, I would have liked to see at least author names applied to the species. On the whole, however, the many photographic positives definitely outweigh the few negatives.

Perhaps the most remarkable thing about this book is that it is privately published, something one doesn't see much of with these glossy photo-guides. This, I suspect, tends to make this book harder to find than many, but the hunt is worth the effort. For more information, write Marine Life, P.O. Box 335, Wenham, MA 01984.

-Chris Boyko

FROM ARTIST ETHELYN HURD WOODLOCK

On January 25, 1994, R. Tucker Abbott, Director of the Bailey-Mathews Museum on Sanibel Island, Florida, wrote me a letter saying, "We hope to have an art showing of shells in paintings a month after the Museum opens, would love to borrow two or three of your spectacular ones."

Several letters and months later, he arrived on September 24 to pick up a painting he agreed to accept as a permanent donation to the Museum, "The Everlasting Chord in The Key of Sea." A color print and the story about it had been in "Of Sea and Shore." I had many articles in the magazine so Tucker knew about my work.

Tucker arrived at 4 PM, taking time out for a Japanese dinner at Kiku, we worked on shells and paintings 'til eleven. The next AM it took two hours to pack everything and load his car. Following is the list of things he took.

Besides the large "Chord" painting he also took "The Rollers" with the marble and a Murex phyllonotus erythrostomus, Swainson, that were in the painting. It had won a First at a Jacksonville Shell Show. He also took my miniature "Mermaid's Cupboard" with a First and Judge's Special ribbons. The "Chord" had won the same so the three paintings went down with the five awards.

I gave him a small painting that had been Bill Old's and he decided to include this as a gift to the Museum too. A whimsey with a cute poem, "I never dreamed/ I'd ever see/ nine junonias/ bunched./ When I did/ I jumped/ out of bed/ and remembered/ the dream."

Tucker had had shell dealings with Princess Margaret so he was pleased to get three black and white photos taken Nassau, Bahamas in 1955. I also gave him a color slide of the painting I did with her in it. He wanted a photo of me so took "Camera" - a self-portrait.

Two booklets of Baribbean Research Institute from St. John, Virgin Id.
"Who's Who in American Art 1991-1992", as I've been in it since 1962.
An antique pearl shell with the cut-out holes for buttons.
A plate to print "The Chord" in black & white and a copy of my slide "Pink Beach, Bermuda, 1954" a water color, my personal gift to him
A fossil shell, Lyropecten jeffersoni edgecombensis, from Rice's Pit, Hampton, Va.
My huge scrap book with dozens of letter exchanges with Bill Old, Victor Lessioviski and Tony D'Attilio. He feels the shell data will be invaluable.

I spent several weeks on a 120-page scrap book about "The Chord" painting and awards it has won, where it has been shown, publicity, etc. My "Of Sea and Shore" articles; New York Shell Club NOTES No. 95 (Oct. 1963) 98.106.115.126.127.128.129 and The Pink Angel. Many color photos and articles about my shelling. A list of the many times I went to Sanibel since 1954. A list of my paintings in public places, 29 of them portraits in schools, hospitals, museums and churches.

AND - 3,298 Janthina, four species; an 8x10 painting of how they float under water on a raft of bubbles and another of a Portugese man-of-war. These came in with the shells. Photos of my sailor's valentines with 396 Janthina. These I wish to keep along with a lamp-base filled with 398. Tucker let me keep 326 small ones so my purple drawer is now filled with butterflies. The Janthina came from Ft. Lauderdale beach in 1961, 1964, and 1967. I cleaned nearly 3,000 each year. My count was 8,168. 1,200 were exchanged with dealers and 2,657 went to friends. If I had not picked them up the sea gulls would have eaten them. I have good photos of the shell show when they won a First.

Tucker would like my two drawers of Mitridae with 298 species and 712 specimens; also, two drawers of limpets, 225 species and 628 specimens.

After he saw all of my paintings with shells, he decided to have a solo show just for me. I am indeed thrilled. I asked him how he's ever get them all down there, and he replied that he already had a $10,000 grant toward that first show. I am to be there too, autographing my book, "Dreams Have Wings." He took two boxes of these. My largest painting is 35x40. Many are large, totaling 26 with 17 assemblages. He will have to decide which ones to show.

Little did I dream what would result from that first letter.

- - - - - - - - - -

An accompanying list provides information on 85 paintings in public places by Ethelyn Hurd Woodlock. Also listed are her shell show awards from 1980 through 1994.

The following page is the review by Anthony D'Attilio of Mrs. Woodlock's book, "Dreams Have Wings" which appeared in No. 299 of NYSC NOTES.

DREAMS HAVE WINGS

by Ethelyn Hurd Woodlock. Privately printed, 1985. 204 pages, 53 paintings in color, 113 illustrations and photographs in black and white. 9 1/2" x 12", hard bound. Price $40 plus postage from the author at 1100 South Belcher Road, #737, Largo, Florida 33541.

Interspersed in the text are many examples of the sensitive lyric poetry of the artist, demonstrating her creative talents beyond painting. A number of the paintings include shells — almost sort of a trademark.

Ethelyn, known as a friend and as a shell collector to members of the New York Shell Club, does a splendid work in this autobiography, revealing the many facets of her life as wife and mother, as well as artist and poet. My personal recollections of her are of someone always friendly, kind, and down to earth, having never let her reputation as an artist lead her into isolation from anyone.

Her profession was portraiture, but she was also masterful with landscapes, seascapes, still life, and miniatures. She has taken many awards, both regional and national. Her real magic lays, however, in her ability to express herself with a certain elan in her sometimes trompe l'oeil, sometimes surrealist vision of the world. To develop this talent, Ethelyn spent a lifetime of hard study and work, starting as an artist from childhood on. Working mainly with casein painting overlaid with translucent colors over a white ground color lent her paintings a jewel-like glow. Thus, even when the subject matter may not be to one's personal tastes, the beautiful color enamel finish of her paintings is aesthetically most pleasing. As though painting wasn't enough, she undertook frequently to making her own frames and often let the painting spill over onto the frame.

Ethelyn's interest in psychic phenomena naturally led into owning a house occupied also by ghosts and ESP phenomena This activity made for much interesting publicity, both for her work as well as the "ghost" house, a fine large home in New Jersey where she also kept house and brought up her family. But her story must be read to be appreciated: her disappointments, sometimes frustrations, as well as her hopes, ambitions and successes.

Another early interest brought her also into the field of collecting sea shells as a hobby which inevitably, as with other members of the New York Shell Club, became a lifetime passion. Having travelled the same path both as artist and shell collector, this reviewer knows from first hand experience these two facets of her life.

As a whole, she relates with great candor her early childhood, teenage life, dating, courtship and marriage, when the last traces of Victorian mores still inhibited the accepted behavior of woman and her place in society. Her relations with her mother, husband and children reveal much about her outside of her career. It is indeed a measure of her determination and fortitude to circumvent all the problems that beset humans, but especially so for the creative artist. That she succeeded in all that she attempted is surely evident in this most delightful autobiography, a testimonial to a genuine 20th century heroine.

Anthony D'Attilio, 1986

Anthony D'Attilio

NOTE: This article was suggested for our publication by NYSC member, Florence Fearrington - we believe you will find it interesting.

CONCHOLOGICAL BOOKS

A bookseller's perspective. A talk given by Tony Swann

of Wheldon & Wesley Ltd. to the

Conchological Society of the Natural History Museum

18th January 1992

Good afternoon, ladies and gentlemen. It is my pleasure to address you today on natural history book selling, in particular as it relates to shell books.

To some people antiquarian book selling may sound a faintly dull occupation. However, I received the invitation to speak to you while in New Zealand on a buying trip to the Far East. I had gone to Japan for 10 days to attend a booksellers' Congress where I not only had the delight of viewing the gardens and temples of Kyoto, but also managed to line up an order for a set of Curtis' Botanical Magazine. From Japan I went on to Australia where in Sydney I met a descendant of one of the editors of the Journal de Conchyliologie and bought a complete set of the Journal as well as many other fine shell books such as Born, Buonanni, Lister and Rumph. In fact I managed to keep 22 business appointments over six weeks in Japan, Australia and New Zealand with substantial purchases resulting. Two years ago I spent ten intensive but pleasurable days in America appraising and valuing the largest collection of shell books in the world in private hands. You can imagine from this that book selling is anything but dull - it's a lovely job and in the course of my work I have at least looked at nearly all the great and small shell books one is likely to see on the market.

By the end of this talk I hope to have given you an idea of how Wheldon and Wesley operates, what sort of people we are and also to have commented on many of the major shell books one is likely to see offered for sale these days. I respectfully ask you to remember at the outset that as a buyer for Wheldon's I have to cover the whole field of natural history books. I am not a 'specialist' in shell books as I could be faced tomorrow with a room full of books on coleoptera or cryptograms and the following week on birds or fish, so I know a little about a lot, but not a lot about one particular narrow aspect of books. You will see as this talk develops how I cope with that.

Two years ago Wheldon & Wesley celebrated its 150th anniversary. We date our origin back to a book shop opened by William Wesley in the brewing town of Burton-on-Trent in 1840. I have recently learned that Alfred Russell Wallace, then aged 17, spent some time in the town when he was first developing an interest in natural history. It would be nice to think that he found food for thought in our shop.

John Wheldon was born in 1807 and from 1823 to 1843 worked as assistant to three different booksellers before setting up on his own in London. The first real record we have of his business is a catalogue issued in 1857.

Wesley's trade in the earlier period seems to have been mainly new books and some wholesaling, whereas from about 1865 Wheldon catalogues are almost all devoted to natural history and other sciences and by his death in 1892 he had issued 132 of them. As his epitaph one might quote the words of the great ornithologist and book collector Alfred Newton. In 1905 he wrote to a friend advising against asking around for a book he wanted, 'as that only induces the people to raise the price. I think I know but one man who could be trusted not do do so. That was old Wheldon of Great Queen Street, Loncoln's Inn Fields. He has been dead for some years now but the shop still goes on and I believe in their principles'.

Wheldon's manager John Edwards became proprietor on Wheldon's death in 1892 and in 1904 he was joined as partner by Harry Kirke Swann, my grandfather, who became sole proprietor of John Wheldon & Co. after Edwards died in 1916.

By 1920, when the book trade had recovered from the effects of the war and was expanding on a world-wide basis, both H. I. Swann and Wesley's son Edward, who succeeded his father in 1891, decided the two firms had so much in common they ought to unite and in February 1921 the company of Wheldon & Wesley was incorporated. The last Wheldon catalogue, issued at the end of 1920 and overprinted with the name of the new firm contained 2,000 items of invertebrates, among them a coloured copy of Born, the Journal of Conchology 1874-1918, Donovan's British Shells and a Perry.

Kirke Swann died in 1926. Control of the company fell into the hands of one W. J. C. Craddock who was an able salesman but a disastrous manager. Eventually Kirke Swann's widow Emma was forced to sack Craddock, install herself as Chairman and her son Charles as Managing Director, just in time to save the firm. That was in 1930 at the height of the great depression when even the best managed companies had difficulties.

During the second world war the business just ticked over from a warehouse on the North Circular Road. Emma Swann died in 1943 and her sister kept things going until the war ended.

In October 1945 Charles Swann returned from service with the R.A.F. and was joined in the business by his brother Howard, my father, who is still very active in the business at the age of 72 and is present here this afternoon. It was at this time that we saw a sustained rise in the company's fortunes. Although there were few fine books in stock there was a considerable quantity of the sort of scientific books and periodicals which were greatly in demand. There was also a healthy cash balance at the bank instead of a crippling overdraft. The firm's long reputation as a specialist brought its reward in the form of opportunities to buy collections it had helped form in the past.

First among these was the mollusc library of E. R. Sykes. It was probably the finest and most complete on the subject ever formed by one man, and is the subject of an Appendix in the second edition of S. P. Dance's History of Shell Collecting (1986). I am indebted to my father for some reminiscences.

In 1947 he was summoned by letter to a beautiful old manor house in Dorset. Sykes' family had a bank which was one of those amalgamated to to form Barclay's. My father had only been in the business a couple of years but Sykes and his wife treated him like an old family friend. Sykes took my father through all his books, the great feature of which was that Sykes had had the bibliographer Sherborn to stay with him and annotate many of them inside the covers with pencil notes. All the books were listed by my father who then returned to the office and worked out a price with his brother Charles which in due course was accepted. It was described as 'the most marvellous library on the subject you could imagine. He had every book - except Poli'. He had not only the first edition of Martini and Chemnitz in 12 volumes but also the second edition, which ran from 1838 to 1920 in 40 volumes and we have only ever once had another set of that.

As for Reeve's Conchologia Iconica, Sykes was on his way to the bank in London one day and he walked along Farringdon Road where there was a book market. On one barrow he saw a volume of Reeve, so he asked the man if he had any more and was told 'Oh yes, I've got a heap of them!' The man took him to the shed where he kept his stock and there was a large part of Hanley's library. Among many other things was a complete set of Reeve. Incidentally, Peter Dance has pointed out to me he believes that much or all of the Hanley library was originally acquired by a bookseller in Penzance, so some research is needed there.

For the whole library in 1948 we gave about £1,500, a lot of money in those days. Apparently Sykes had bought the majority of his books from Wesley before 1914 so even then we were very much in the business of 'recycling' collections from old customers. If you read Peter Dance's Appendix you will find our catalogue of this collection even more astonishing when you realise that many of the finest books had already been sold to our then two most important customers for the subject, the Field Museum in Chicago and Allan Hancock Foundation whose library is now located in the University of Southern California.

Sykes's fine dedication copy to the Empress of Austria of Born's Testacea, bound in red morocco with the imperial eagle on the covers, went to Stillman Berry in California for £15. Berry competed for the books with the notable collector Dr. Irene A. McCulloch whose personal library is in the Santa Barbara Museum of Natural History.

Many books went to J. R. Tomlin, whose library is now in the National Museum of Wales. A friend of Nora McMillan's who knew Tomlin as a young and handsome man is quoted as saying 'Tomlin would flirt with a broomstick if it wore a skirt'. Albert Salisbury was another good customer. My father describes dealing with Sykes' library as his biggest education in shell books because under his elder brother's guidance he wrote practically the whole section of catalogue 67 which contained it, using also what Sykes had told him and Sherborn's notes inside the covers of the books.

A little later we bought the library of Baini Prashad, Director of the Zoological Survey of India, not in very good condition but a considerable quantity of books, mostly on mollusca.

The next really big collection was the Conchological Society's library, about 1957. There had been quite a discussion in the Society's Committee as the library had been stored for years unused in a cellar at the University of Leeds. The university wanted the space and no one in the Society would look after it, because like many amateur societies it had no home. It was therefore decided to sell the books and use the money for promoting the other activities of the society. When my father went up to look at the books many of them were lying on the basement floor and, with the pollution from coal in Leeds some 50 years ago, it looked as if someone had sprinkled soot all over them. We spent a lot of time cleaning them. A copy of Sowerby's Thesaurus for example, in nice red morocco, had to be washed with saddle soap to get the binding in saleable condition. This collection appeared in our catalogue 88 of 1958 when the attractive Swainson Exotic Conchology 2nd Edition of 1841 was offered for £15.

Then came the collection of Ronald Winkworth, one of the two secretaries of the Royal Society. He had died some ten years before and his widow had not wanted the books moved, keeping them as a sort of memorial to her husband. When she died we dealt with Winkworth's nephew and it was a good collection. Many papers of which he did not have a printed copy he would write out in longhand in a beautiful script. The nephew was astonished by how much we were able to give him for these books. Nora McMillan remembers staying with Winkworth and his wife and taking some Rissoas to be identified, which Winkworth promptly named. She exclaimed 'But these are not the names in your list' (that is the List of British Marine Mollusca in J. Couch, Vol. 19 1932) to which he replied "I don't use those names. I use Jefferys and translate!"

Perhaps the last major mollusca library we bought was that of Albert Salisbury in 1964 after the company moved to Lytton Lodge. Salisbury used to arrive at our premises in an ancient car and was always smart in his appearance. It was a large house in which the books were located, but in an extraordinary mess. Again my father dealt with the nephew who said "My uncle's wife died on their honeymoon about 1900 and he never married again, although he did have a housekeeper until recently." One of Salisbury's other hobbies was the organ and the drawing room had a fair sized organ built into it. His study was so cluttered that he ended up with a desk on the landing outside and the latest acquisitions of shells and books were in orange boxes on the floor. In the drawing room the sofa and armchairs were piled high with numbers of the various journals which he took. Some of his books went to the Royal Scottish Museum but we got the majority. My father remembers him as a charming man and Nora McMillan remarks that he also invented the immersion heater.

All this was before my time. I joined the firm in 1974. My degree was Politics and after Reading University I went to the R.A.F. College Cranwell, graduating as a pilot but finding I was emotionally unsuited to a military way of life I resigned during advanced training. I taught English in Bordeaux for a few months after leaving the Air Force but soon concluded there was little future in that. I came back to give the family business a try and have now been a bookseller for nearly 18 years, having been promoted to Director in 1983. I am delighted to say I have found my niche and thoroughly enjoy my job. It is fortunate that I quite rapidly developed, not just a love of books, but a feel for books and their importance and value which is not quite the same thing. Perhaps I could explain that a bit by saying my customers are sometimes puzzled when I offer more - or less - than they think a book is worth. I occasionally have to explain that a bookseller's perspective on a work might be different from that of the enthusiast or working scientist and I may sometimes have a different idea of its value, based on what I think we can sell it for. Naturally I cannot carry the price of every one of the many thousands of books I handle over the years in my head but that 'feel' for books I mentioned means I very rarely make major mistakes.

The balance of Mr. Swann's talk will be included in the September issue of NEW YORK SHELL CLUB NOTES.

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FOUNDED JAN. 1949

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The Treasurer-Membership officer should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

1995 - 1996

PLEASE NOTE: There may be differences in the dates and/or places for meetings from those given below. Consult the current issue of N.Y.S.C. NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

September 10, 1995
October 8, 1995
November 12, 1995
December 10, 1995
January 14, 1996
February 11, 1996
March 10, 1996
April 14, 1996
May 12, 1996
June 9, 1996

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, starting at 2 P.M. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying the Museum admision fee by presenting your New York Shell Club membership card.

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September to June, in Room 319 of the American Museum of Natural History, New York City (unless other wise notified). On meeting days your NYSC membership card will provide admission to the Museum for you.

PROGRAM SCHEDULE

SUNDAY, September 10, 1995	2:00 PM	"SHELLS OF WALDEN POND", slides and script "SHELLS OF EAGLE ISLAND, MAINE", Christina Joyce
SUNDAY, October, 8, 1995	2:00 PM	"SHELLING ON LONG ISLAND", slides and script, Helen Madow, LISC
SUNDAY, November, 12, 1995	2:00 PM	MEMBERS' SHELL EXCHANGE and "MULTITUDE OF MOLLUSKS" Marty Stauffer Prod.

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IN TRIBUTE TO WALTER SAGE

Prior to the Shell Club meeting on Sunday September 10, members and friends of Walter Sage will gather for lunch at 12 noon in the Garden Cafe (ground floor) at the Museum. We expect to have a large table together, so if you wish to join us please telephone 212-866-1298 by Friday, September 8, so we can notify the restaurant of the number expected on Sunday.

WALTER E. SAGE, III
1949 - 1995

After an illness of several months, Walter Sage died on July 2, 1995 from complications resulting from oral cancer. Walter had been on the staff of the American Museum of Natural History in New York City for twelve years, serving with distinction as the Collection Manager of its Collection of Recent Mollusca. As a Senior Scientific Assistant in the Department of Invertebrates, he was largely responsible for expanding the reference collection of mollusks, a task that he undertook with considerable success. He was the author of numerous popular articles and nine scientific papers coauthored with Dr. William K. Emerson, Department of Invertebrates at the American Museum.

Walter was Treasurer of the Conchologists of America and an active member of several professional and amateur malacological organizations, including the Long Island Shell Club. Walter joined the New York Shell Club in September of 1983, was elected a Director in 1986, and became Editor of NYSC NOTES in September 1993. Through the years he was always ready to help in planning meetings, sorting shells for auctions, helping at the auctions, and always helpful when and where the need arose.

Walter is survived by his mother, Mrs. Walter E. Sage, II, a brother and two sisters. He will be fondly remembered by his many friends and colleagues.

In recognition of the outstanding contributions Walter Sage made to the community of malacologists, the Museum plans to identify the Department of Invertebrates' Malacology Fund as the William E. Old, Jr./Veronica Johnson/Walter E. Sage, III Malacology Fund. Any contributions from Walter's friends and colleagues will be deposited into the Old/Johnson/Sage Malacology Fund. All contributions should be made payable to the American Museum of Natural History for the William E. Old, Jr./Veronica Johnson/Walter E. Sage, III Malacology Fund, and mailed to the Museum, Attention of Dr. William K. Emerson, Dept. of Invertebrates.

Dr. William K. Emerson, Theta Lourbacos

THE MAN IN THE SHELL SHIRT(S)

Walter Sage was a shell guy, through and through, and he let the world know it with his shirts. Sport shirts - short-sleeved, light-weight, exuberantly colored and liberally illustrated with shells. Who among his friends and associates ever saw him when he was otherwise shirted?

His goal was to build a wardrobe of 365 such shirts (no two alike), since season and weather never constrained him. If the number seems impossible think beyond the haberdasheries to the fabric shops. The warehouse of yard goods he had stashed away might one day have brought him to his goal in finished shirts - at least close.

Walter not only enjoyed being a shell guy, but also the work it led him to, as a professional at the American Museum and as a volunteer in amateur shell circles. And everywhere, his enthusiasm, his friendly nature and his generosity with his time, energy and expertise broadened and deepened the pleasure of others.

Twelve years ago malacologists and conchologists in many parts of the world wondered if the large void, professional and personal, left behind by Bill Old could be filled. Now, much too soon, the same question is being asked about the huge empty space Walter has left behind. But however well it might be filled again with ability, dedication and warmth, Walter Sage will be remembered by all of us who knew him as a thorough professional, a good friend and a guy who really did something for whatever shell shirt he happened to be wearing.

Milton Werner

HIGHLIGHTS OF JUNE 11, 1995 MEETING

In her Annual Report, Treasurer Theta Lourbacos noted that expenditures had exceeded income by almost $400 and called on the Executive Committee to explore ways of reducing the deficit in the future. After discussion a date was chosen for a meeting to address this problem and make other plans for the coming year.

For the election of officers for the coming year, the Nominating Committee presented the following slate of candidates:

President	Ed Cowles
Vice President	Larry Potter
Secretary	Milton Werner
Treasurer	Theta Lourbacos
Historian	Nick Katsaras
Programs	Al Scarpetti
Directors	Al Scarpetti, Walter Sage, Allen Aigen, Romuald Czepulkowski

There being no nominations from the floor, the secretary was empowered to cast one vote for the election of the entire slate.

Al drew attention to Walter Sage's hospital address, which was noted on the chalk board.

The door prizes were Oliva spicata, won by Mel Springer; Acavus phoenix, won by Walter Chernak; Pleuroploca gigantia (juv.), won by Milton Werner.

The program was presented by Mel and Sylvia Springer, who started by showing some slides taken during the Club's visit to Fred Cannon's home in January. Attention then turned to their collecting trip to the Philippines in December of 1993. Their first destination was Manila, where they spent some time with Carlos Leobrara in his Carafel Shell Shop, taking photographs there and about the city. Their first shelling stop was Dalapiri Island, near northwest Samar, where a few days of snorkeling yielded about 27 species of cones and much else. Their success was illustrated by many shell photos and underwater scenes. The next stop was Dipolog on northwest Mindanao, where the shelling - and picture-taking - were also good. Time spent on Santa Cruz Island and in Zamboanga were highly productive as well. The total haul of shells put the Springer luggage well over the airline weight limit. The question and answer period that followed the presentation was long and busy.

EARTHWATCH PROGRAMS - CORAL REEFS, CONSERVATION

EARTHWATCH sponsors expeditions that improve the quality and management of life's resources. Participants may come from every nation and all ages. The following projects were scheduled for 1995-6 in the general program, THREATENED HABITATS.

BAHAMIAN REEF SURVEY, San Salvador, The Bahamas - damage to coral reefs

MAUI'S THREATENED REEFS, Maui, Hawaii - reef health

BELIZE'S BARRIER REEF, Tobacco Caye, Belize - predator ecology

AUSTRALIAN REEF CULTURE, Great Barrier Reef Aquarium, Magnetic Island, North Queensland - coral propagation

MARINE FLORA OF THE AZORES, Island of Flores, Azores,nearshore conservation

SAVING CHINA'S REEFS, National Coral Reef Natural Reserve, Sanya, Hainan Province, China - coral reef conservation

EARTHWATCH is published bimonthly by Earthwatch Expeditions, Inc.,
680 Mount Auburn St. P.O. Box 403, Watertown, MA 02272

(The following is the final part of "CONCHOLOGICAL BOOKS; the first part appeared in No. 335 NOTES, June, 1995)

CHONCHOLOGICAL BOOKS

A bookseller's perspective. A talk given by Tony Swann
of Wheldon & Wesley Ltd. to the
Conchological Society of the Natural History Museum, London
18th January 1992

There have been significant changes in the market since I joined Wheldon's such as increasing competition from the auctioneers (now checked by the recession and lack of books for sale) as well as the growing impoverishment of academic institutions around the world. By the early '80s I had acquired a good working knowledge of our field and developed the initiative to begin buying and selling. I soon found it is enormously satisfying to purchase a book in Hitchin, or Milan, or Sydney, knowing it is a good buy, having the pleasure of handling and collating it and then passing it on to a customer who might have been looking for it for years and would be delighted to have it. It is a characteristic of the trade that in the larger antiquarian book shops you usually find a number of people who are unambitious and apparently happy to stay doing routine clerical work. However, it is essential you have at least one member of staff who is prepared to jump on a plane to Stockholm or Paris at short notice and get out there to find the books. It is of course also essential that one has the supporting staff to help process and sell the books when you have bought them. The key though, without a doubt, is buying. If you have a good book at a reasonable price there is little difficulty in selling it. The problem increasingly, indeed the general lament from the trade these days, is the difficulty of finding good stock. I am off to Cape Town and Mauritius on Monday to try and ensure we continue to maintain a good stock. (No shell books in prospect there, I'm afraid.)

Thinking of the major collections of shell books I have seen in my 18 years with Wheldon's I have to confess there have been remarkably few of them. My first experience of a really big shell library was in 1987 and was also one of my biggest disappointments. It was the collection of the late Juan Gavala who lived near Cadiz. I flew down to Seville and met his daughter who turned out to be a most charming and vivacious lady lawyer. She and her husband drove me down to a small town near Cadiz where Gavala had lived and I there discovered one of the most fabulous mollusca libraries you could hope to see. There was an imperfect copy of Poli we had sold him in 1964, a beautiful clean complete copy of Martyn in red straight grain morocco, numerous works by Hidalgo, Dautzenberg, Sowerby and a host of others. I spent a delightful day working through the books and the following day in my hotel back in Seville I finalised prices and prepared the formal offer. It was one of those happily fairly common cases where the customer became a friend and there was complete trust on both sides. When I presented her with the offer she said 'That is double what Sotheby's told me they could get for the books' and she accepted it. I already knew we would have to prepare fairly involved customs' documentation but it then emerged that the government had the right to step in and buy any national treasures at the price a foreign dealer was offering for them. I crossed my fingers and hoped the government would not realise that this collection certainly amounted to a national treasure. You can imagine my disappointment when a few weeks later Senora Gavala wrote to me saying the government had decided to purchase the entire library and that it would probably go, if I remember correctly, to a museum in Cadiz. If ever any of you are on holiday down there I would recommend you try and locate it, because I can assure you this was as fine a collection of shell books as you are ever likely to see.

We do not just have problems with Spain. The bureaucracy in France and Italy often makes trade in old books difficult. In spite of this we do a fair amount of business with France. I speak French, love the country and go there often, but it is a very awkward place to do business with and that will not change with the 'Common Market' even though the last major specialist in natural history in Paris, Librairie Rousseau Girard, has just closed and I intend to ensure a fair amount of their business comes to us.

The best collection of shell books we have offered in my time was very recently, in our catalogue 193 of April '91 and included items such as Born, Buonanni, Gualtieri, Hirase, a set of the Journal de Conchyliologie, Rumpf and Tryon & Pilsbry's Manual of Conchology, all of which we sold rapidly. Not only do we now export 67% of our turnover, very many of our major purchases are from abroad - we could not survive for a moment on the British market alone. A visit to a natural history museum in California led to a useful purchase of some of their duplicates and enhanced the mollusca section to which I refer, the bulk of which came from Australia. You can see how fortunate I am, loving books and greatly enjoying travel. I have even visited Hawaii on business twice in recent years.

I wish I could tell you more about large collections of shell books I have seen or bought, but they do not exist. It is very bad for any market when the collectables are so scarce that it is extremely difficult to form a major collection in one lifetime. People tend to lose interest if they cannot find the material to build up their collections. I can think of serious shell-book collectors in places as far apart as Germany, Portugal and South Africa who have plenty of money and regularly send us letters and wants' lists but we cannot find the books for them.

Perhaps it would be appropriate to run through some of the major books which are likely to appear on the market and comment on prices and availability, as well as relative importance from a bookseller's point of view. I am making the assumption that most of you are bibliophiles and would like to possess a significant library yourselves one day.

We start, naturally, with Aristotle who left us a remarkable history of Cephalopods and by his own researches was able to characterise several groups of Testacea. Obviously he has gone through innumerable editions over the last 500 years and is still in print.

Moving to Rome we have Pliny's great encyclopaedia which Johnston, in his Introduction to Conchology 1850, says largely anticipated the taste and credulity of his age, and that to conchology as a science he has added nothing which Aristotle did not supply, although he furnished some anecdotes for a chapter on its economical applications. We have in stock a copy of the English translation by P. Holland, two volumes folio 1601. There is also a very popular edition in 6 volumes by the publisher Bohn 1855-57.

By the 16th century, barely 100 years after the invention of printing in Europe, we see massive volumes published by Belon, Rondelet, Gesner and Aldrovandus between 1551 and 1599. Most of these enormous and sometimes credulous compilations contain sections on conchology and their scientific importance is in no small part due to the illustrations of many of the species mentioned.

Johnston devotes some space to Fabius Columna, mentioning his two works dated 1616, 'De Aquatilibus' and 'De Purpurea', the latter containing his genuinely scientific researches into Tyrian purple with good woodcuts. We had this book in 1989 at £225, and we do still handle many other 16th and 17th century books.

A great stimulus to the production of fine shell books was the rise of museums linked to commercial interest in beautiful shells, the museum being said to have originated with Aldrovandus. It is from this institution of museums that we date the origin of Conchology as a separate branch of natural history, their catalogues being of some historical significance (that of the Duchess of Portland of 1786 comes to mind) and the love of making collections of shells leading directly to Buonnani and Lister, whose works are the first exclusively devoted to shells.

Buonnani was a Jesuit whose book - Recreatio Mentis et Oculi 1681 - demonstrates talents which, though respectable, do not raise him above the level of his age. One should not denigrate him too much as many of his illustrations were referred to by Linnaeus. We had a good copy of this work for £1,000 last year, a reasonable price in view of the fact that the bibliographer Cobres noted it as 'ein seltenes Buch' in 1782.

According to Johnston, on the other hand, Lister was 'a true naturalist, and the first conchologist of decided eminence'. We had the 1770 edition of his History of Shells at £1,500 in catalogue 193. Turton described it as an admirable volume, the labour of many years, with the 1,084 engravings all drawn from original specimens by his daughter Susanna and his wife Anna. Certainly this work is a great landmark in the advance of conchology. The original edition produced between 1685 and 1692 is now very rare.

By the time of publication of Rumpf's Amboinsche Rariteitkamer in Amsterdam in 1705, a remarkable flood of shells was entering the museums, or what one might more properly call the private cabinets, of Europe, particularly in Holland. While you will all have heard of tulipomania, there was at this time, particularly in Holland but also in England and France, something of a speculative bubble in shells as well and extraordinary sums were paid for rare specimens. Happily that encouraged the production of fine books on the subject. A particularly good example of luxury shell book production is Born's Testacea Musei Caesarei Vindobonensis, Vienna 1780, which Maria Theresa instructed Born to produce on the imperial collection of shells. It is a folio with 18 fine coloured plates and we sold a copy last year for £1,750. How things have changed since, as I mentioned earlier, we sold the finest possible copy for £15 in 1947.

I must not omit to mention Adanson's book published Paris in 1757 'Histoire naturelle du Senegal: Coquillages.' Tryon, writing in 1880 in his Manual of Conchology, went so far as to say 'Adanson must be regarded as the founder of Malacology'. It is a handsome 4to volume with 19 engraved plates and we sold one for £475 two years ago.

Moving on, Johnston mentions Knorr, Martini & Chemnitz, Pennant, da Costa and Martyn and rather scathingly comments on many books as merely the labours of iconographists and collectors, of little significance to his history. Some of them, however, are of great interest to the bookseller and book collector and very beautiful.

I have to say that the great pleasure I derive from handling books is an aesthetic one and also even a physical one. The feel of a fine old binding which houses paper of the highest quality, beautifully typeset, and fine woodcuts, engravings or hand-coloured lithographs, gives me a real thrill and a sense of privilege in that most people have to be relatively wealthy to enjoy such pleasure. This is something that adds immeasurably to the quality of my life as I live very modestly, but every day can walk into our showroom and enjoy contact with objects of real beauty. I am sure Johnston would have scorned my lack of a scientific background, but my simple enthusiasm for fine illustrated books is useful in that it is the illustrations which tend most of all to make the book valuable and saleable these days. Regrettably I do not have the time to go into detail on the various techniques of book illustration over the centuries. May I suggest you consult Peter Dance's 'Classic Natural History Prints; Shells'? I have brought along the finest old shell book we have in stock at present which will enable you to share briefly some of the pleasure I have been talking about. This is Perry's 'Conchology' of 1811. It is however a book that has been subject to violent criticism. The illustrations are so inaccurate that Sowerby suggested Perry has only seen them in his dreams. The text has been equally criticised for the new names introduced, such as 'Cypraea camelopardalis' of which Reeve wrote: 'I consider the "Cameleopard" of Perry should no more enter the nomenclature of zoology than the "Red Lion of Brentford". However, Perry's name is now accepted in place of the 'Cypraea melanostoma' of Sowerby which Reeve preferred.

Perhaps the most beautiful of all illustrations of shells are in the Choix des Coquillages of Regenfuss (Copenhagen,1758) with its 12 large folio coloured plates. This is a book which I have not yet had the opportunity to buy. In 1935 my uncle Charles, who was then in charge of the business, had a probably unique copy with an additional 12 coloured plates prepared for a second volume. He sold it for £10 to the late Sacheverell Sitwell who, as my uncle remarked rather bitterly, took nearly a year to pay for it. In 1956 it was sold at Sotheby's for £160 and today would fetch several thousand pounds.

Talking of fine collector's items brings to mind Martyn's Universal Conchologist of 1784-90. The first two volumes are the most significant because they figure shells from Cook's voyages. They do still come on the market and I have heard of these two volumes changing hands for £6,000 recently. The stipple-engraved hand-coloured plates are the most beautiful representations of shells that I have personally seen. I cannot resist quoting Henry Chaney of the Santa Barbara Natural History Museum on his experience with the copy of Martyn we sold to Irene McCulloch in 1947 which had an extra volume of proofs and drawings with it. He says 'this copy then disappeared from view for exactly 40 years. I found the "five" volumes, wrapped in a newspaper dated 1948, when I was cleaning out her office the week after her death. It was an amazing thrill similar to finding the coloured Poli in her house buried under an old carpet, covered with a thick layer of dust and sandwiched between the Atlas from the Bonite (voyage) and a superb copy of Knorr's Deliciae Naturae. I was so undone at the time I immediately removed them from her house, fearing that the structure would burn down before I could return the next morning.'

You will understand from the way I referred earlier to Poli that his work is one of the great rarities in the field and keenly sought after by collectors. It is 'Testacea utriusque Siciliae', 3 volumes 1791-1826, the third volume being published posthumously. It was produced by the Neapolitan physician Poli in an expensive manner and consequently had a very limited circulation. I would not like to commit myself to stating the very large sum of money you might now have to pay for one of the very rare coloured copies.

Thinking of large sums of money I will jump right into the 19th Century with Reeve's Conchologia Iconica 1843-78. This is surely the most important illustrated work on shells with 2,727 hand-coloured plates of over 20,000 figures. Recently we were asked to value a copy which a customer wished to donate to an institution. We put £20,000 on it and both parties agreed this was fair. A copy fetched £16,900 in England at auction in 1988 and the London bookseller who bought it (now no longer dealing in natural history) catalogued it at £44,000. Of course he could not sell it at that price and it has passed to a continental dealer.

It is always most inadvisable to assume ignorance on the part of your customer. Very frequently my clients know at least as much about the books in their narrow field of specialisation as I do and I am always ready to admit when I need to check with our reference system for a price or bibliographical detail. It is far better to do that than to take a risk on a price and possibly appear dishonest. In many cases, even when I have a very fair idea of prices, I will check before offering.

I could have prepared another hour's talk on the works of Donovan, Sowerby, Turton, Brown, Wood and Hanley, let alone Gualtieri, Knorr, Kiener, Tryon, or Martini & Chemnitz. Perhaps some other time. As I am near the end I will conclude with a few general comments on the state of the market and on our business in particular.

What I have tried to demonstrate is that, while the supply of shell books is extremely limited and our stock at this moment is frankly pathetic (mainly because they sell so fast!), we are even these days sometimes able to offer a selection of the great books in the field at reasonable prices. When I first joined the business we would go regularly to the London auctions and come back with van loads of good books. Now, instead of an enormous room full of all sorts of books, when you go to a London auction it is usually the same limited numbers of quartos and folios which come up time and again with very few shell books among them. We hardly go to auctions now and rely mostly on the families of old private clients selling back to us, disposals of duplicates from institutions, and to some extent on general booksellers. As you can imagine, anything special tends to sell very rapidly, often even before the catalogue is published. I would urge you, if there is anything you are particularly looking out for, to write to me in anticipation of us buying a collection in your field. Please note you are always most welcome at Lytton Lodge even though we have little in the way of shell books at present.

To end on a positive note: I do know where there is a major conchological library and we have a chance of buying it, although the owner is in no hurry to sell. That is the joy of this business. You never know when a letter is going to arrive, possibly taking you thousands of miles across the world and leading perhaps to the purchase of a major collection which will delight our customers from here to Tokyo.

Thank you very much for listening to me.

We deeply appreciate Mr. Swann's authorization to include in NYSC NOTES his speech, CONCHOLOGICAL BOOKS. Our thanks go also to NYSC member, Florence Fearrington, who proposed printing it and obtained Mr. Swann's agreement.

THE BAILEY-MATTHEWS SHELL MUSEUM

Tuesday, June 27,1995 was the date for the 'advance opening' for The Bailey-Matthews Shell Museum, with the Grand Opening set for November 18, 1995. Currently, the museum will be open from 10 a.m. to 4 p.m. daily, except Monday; admissions to the Exhibit Hall during this period will be $4 for adults, $2 for youths ages 7 through 15, children under 6 admitted free. Museum members or members of a supporting shell club are admitted free on presentation of their membership card.

Fourteen major exhibits are in place, including Gifts from the Seas of Sanibel and Captiva, a superb land snails habitat exhibit with motion-activated sound, and a fascinating mangrove habitat diorama. The museum store has a selection of shell-oriented items, as well as bargain-priced duplicate shell books from the museum's main library.

You may obtain additional information from Shell Museum & Educational Foundation, Inc., P.O. Box 1580, Sanibel Island, FL 33957.

SHELL GAME: PICKING STATE FAVORITES

From the New York Times of July 3, information on the following 'state favorites' was provided; the occasion was final approval of the designation of the knobbed whelk - also known as the conch, or scungilli - the official state shell. Other such designations from nearby states follow:

	CONNECTICUT	NEW JERSEY
ANIMAL	sperm whale	horse
BIRD	American robin	eastern goldfinch
FISH		brook trout
FOSSIL	Eubrontes prints	
FLOWER		violet
SHELL	knobbed whelk	eastern oyster
TREE	white oak	red oak

	NEW YORK
ANIMAL	American beaver
BIRD	bluebird
FISH	brook trout
FLOWER	rose
FRUIT	apple
TREE	sugar maple

(The above list is not complete - some categories listed for some states were omitted, categories such as 'tartan', 'folk dance', 'muffin', etc.
The Editor)

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Dues for all members are due and payable for the following year beginning each September.

Full Membership $12.00 per year
Full Family Membership $15.00 per year
Corresponding Membership $10.00 per year
Foreign Membership $12.00 per year, paid in U.S. currency

The Treasurer-Membership officer should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

1995 - 1996

PLEASE NOTE: There may be differences in the dates and/or places for meetings from those given below. Consult the current issue of N.Y.S.C. NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

September 10, 1995
October 8, 1995
November 12, 1995
December 10, 1995
January 14, 1996
February 11, 1996
March 10, 1996
April 14, 1996
May 12, 1996
June 9, 1996

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, starting at 2 P.M. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying the Museum admision fee by presenting your New York Shell Club membership card.

NOTE: NEW YORK SHELL CLUB pins are available;

$3.50 at a meeting; $4.00 by mail

(Mail orders should be sent to
Theta Lourbacos, 66 W. 94 St., Apt. 20C
New York, NY 10025)

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September to June, in Room 319 of the American Museum of Natural History, New York City (unless notified otherwise). On meeting days your NYSC membership card will provide admission to the Museum for you.

PROGRAM SCHEDULE

SUNDAY, December 10, 1995 2.00 PM	"CEPHALOPODS" video presentation "MOLLUSKS" - Marty Stauffer Prod.
SUNDAY, January 14, 1996 2.00 PM	"TEXAS SHELLING" slides & cassette from La. Malacological Soc.
SUNDAY, February 11, 1996 2.00 PM	"SHELLS IN ADVERTISING" photography by George Raeihle

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HIGHLIGHTS OF RECENT MEETINGS

September 10, 1995. Program Chairman Al Scarpetti announced that he and Mel Springer, President of the Long Island Shell Club, have been discussing the possibility of a joint bus trip to the Philadelphia Shell Show. He also said that Dorothy Raeihle had suggested a memorial to Walter Sage, which should be considered, and that Theta Lourbacos had suggested as a program idea,"How I Acquired My Shell Books".

Ed reported a communication from Dr. Ed Dunlap stating that he will donate his Cypraea collection to the Museum, and his shell books, shell club publications and fossil shells from Sarasota to the Club.

Carl Ehrlich had on display a number of cones that he had collected on a recent trip to the Solomon Islands.

The program was a slide presentation created by Christine Joyce. Its two subjects were "Underwater Walden" and "Shells of Eagle Island" (Maine). The first pictures are of the biota of the pond made famous by Henry David Thoreau. The photos in the second cover shells, plants and scenes, including some of nearby islands. The accompanying script was read by Al Scarpetti.

October 8, 1995. Treasurer Theta Lourbacos closed her monthly report by noting that 42 renewals of membership had been received during the month of September.

Larry Potter drew attention to Tucker Abbott's tribut to Walter Sage in the September issue of American Conchologist.

Mel Springer distributed flyers giving details of the bus trip to the Philadelphia Shell Show on Nov. 11, sponsored by the New York and Long Island Shell Clubs.

The Program was a slide presentation titled "Shelling on Long Island," created by Helen and Stan Madow. The photos are of shells and shelling areas, including a snow-covered North Shore beach where knowing and hardy souls made some good finds. The accompanying script was read by Mel, a veteran collector of the mollusca of Long Island. From personal experience he was able to add many observations and tips of practical value to anyone who might be inspired to go and do likewise.

November 12, 1995. Al Scarpetti drew attention to a letter received from the Bailey-Matthews Shell Museum on Sanibel Island, Florida, and signed by Harold M. M. Tovell and Dr. R. Tucker Abbott, inviting Club members to the official opening of the Museum.

Milton Werner reported on having met the Museum's newly hired scientific assistant, Miss Yae Ri Kim, who is taking on the considerable challenge of replacing Walter Sage.

Al offered the reminder that the Club should send a message of condolence to the family of Tucker Abbott. Ed said that he would do so. Al also reported on the bus ride to the Philadelphia Shell Show.

The door prizes were Helicostyla intorta, won by Mark Shapiro; Mitra swainsoni, won by Irv Hoppenwasser, and Haustrum haustorium, won by Milton.

Ed noted that the program for December would be the showing of two video tapes - "A Multitude of Mollusks," by Marty Stouffer, and "Incredible Suckers," a look at cephalopods in the wild and in the lab, from the PBS Nature series.

The program for the day was a shell-swapping session among members. The material was plentiful and highly attractive, and everyone came away with an improved collection.

Milton Werner

WORLD'S GREATEST SHELL COLLECTOR?

by Henry S. Gordon

Let me introduce to you Nicolaos Apostolou, born in 1909 at Episkopio, Orinis, Nicosia, Cyprus.

"Who's that?", you ask. Why, Nick Katsaras, of course. "And how did the first of those names become the second?" you ask. Well, when Nick transplanted himself to the U.S. he thought he should become easier to pronounce. He picked Katsaras because it was the nickname of his paternal grandfather. It means "dried up wood." Don't ask.

Anyway, the new Yankee eventually became historian of our own New York Shell Club, presenter of the famous Katsaras shell auctions of the late 1950's and the 1960's, contributor to the New York Shell Club Notes, and correspondent with shell dealers, other collectors and shell scientists all over the world. (What a fantastic stamp collection he must have, along with his spectacular shells.)

Nick says he never even saw the ocean surrounding his island home until the day in 1930 when he set sail for America "to find gold or whatever." He lived at first in New York City, working in a restaurant, and then in Babylon, Long Island. A friend who had a shoe repair shop in Bergenfield, N.J. induced Nick to become a cobbler, and after a period of apprenticeship, Nick found himself owning a shoe-repair shop, which he ran from 1934-41. He was then drafted into the Air Force and spent three years in service, going over in a troopship with 7,000 via Australia, and ending up in Bombay, India. (Ask Nick about what a monsoon is like.) Placed on "overseas" shipment for the invasion of Japan, Nick was spared that when news came of the dropping of the first atomic bomb.

After WWII, Nick bought a shoe-repair store in Teaneck, N.J. and resumed his life as a cobbler. He "stuck to his last" until he retired in 1981.

In the 1950s, on his days off, Nick was fond of visiting the Museum Shop of the American Museum of Natural History in New York City, where there were seashells for sale. One fateful day for Nick - and really for all of us who love beautiful shells - was when he saw in the Museum Shop a notice from the newly formed New York Shell Club, seeking members. The Club had met once, and Nick joined during its second meeting. Since then (through November, 1995), he has missed two meetings - a record of 435 out of 436.

Who hasn't heard about the Katsaras auctions. On October 5, 1958, probably well influenced by the famed Buttonwood Shell Auctions that took place outside of Philadelphia, as well as the New York Shell Club auctions, Nick held the first one-collector seashell auction in New York City in, I think, 50 years. I was reading the New York Times that Sunday morning and saw in it that a Bergenfield, N.J. cobbler was presenting a shell auction. Having not a half-year earlier broken a promise that I would never buy a shell, I quickly dressed and raced into Manhattan. There at the National Arts Club at Gramercy Park, I entered a long, narrow, well-lit basement room to goggle at hundreds upon hundreds of "gem"-quality specimen shells (and I do mean gem quality).

At this first Katsaras auction, I gorged on spectacular olive shells in particular. I seem to remember that I bought about 70 shells for $17; the next year, when my interest shifted to cones, it was about 17 shells for $70. This started my shell buying in earnest.

Even though Nick wasn't the official auctioneer at his auctions (the New York Shell Club's Tony D'Attilio handled practically all of the early ones), he surely wasn't a silent presence. Informed comment flowed from him. Hardly a shell failed to draw some enlightenment on its rarity, location, quality, history, etc. remarks delivered by a consummate showman, even if unaware of his talent that way. I know that malacologists are mostly reserved about the enthusiasms of lay conchologists. But a quiz contest on shells and shelling lore, Ph.D. vs. cobbler/conchologist, might cause some rethinking.

If you happen to meet Nick on the street, ask him what he has in his pockets. There's a good chance you'll be treated to a shell show in miniature. It was reported here not long ago that he had left a sweater in a library. He got it back the next day, which was extra fortunate because it had pockets, and there was a Voluta bednalli in one.

What more can I say? Nick Katsaras can be opinionated, even cantankerous. But he is also lovable, generous to a fault with the New York Shell Club and supremely fascinating. There is only one Nick Katsaras in the world of shell collecting. Who could ever hope to clone such a one-of-a-kind!

P.S. I don't know of a single shell named for Nick. Isn't it about time?

DR. R. TUCKER ABBOTT

(from the Obituary of R. Tucker Abbott
by Robert McG. Thomas, Jr.
NEW YORK TIMES, November 9, 1995)

Dr. R. Tucker Abbott, Director of the new Bailey-Mathews Shell Museum died at his home on Sanibel Island, Florida, on November 3, 1995. Museum officials said the cause was a stroke. He was 77 years old.

From an early childhood interest in shells, his career included scholarly work at the Smithsonian Institution, The Academy of Natural Sciences in Philadelphia and Delaware Museum of Natural History in Wilmington. His work earned him a world reputation for knowledge of mollusks and his travels throughout the world included the discovery of some 1,000 species. His "American Sea Shells", first published in 1954 was followed by some 30 follow-up books, from pocket-size field guides to coffee-table tomes. On leaving the Delaware museum in 1977 he formed his publishing company, American Malacologists, Inc., now operated by his daughter, Cynthia Sullivan, Andover, Mass.

Always interested in science, he was a young, rabid collector of shells. After Harvard University, he continued his study of malacology and eventually received his master's degree and doctorate from George Washington University. During this time he established a successful malacology research station - on Guam, where his work was instrumental in stemming an outbreak of a parasitic disease traced to snails during World War II.

Since 1989 Dr. Abbott helped organize and stock with 2 million shells - representing 20,000 species of molusks - the Bailey-Mathews Shell Museum, formal opening scheduled for November 18,1995.

In addition to his daughter, Cynthia Sullivan, Dr. Abbott who was married three times, is survived by his wife, Cecilia; two other children from his first marriage; three stepchildren from his third marriage and five grandchildren.

(Reprinted from "AMERICAN SCIENTIST", Volume 83,
May-June, 1995; Copyright 1995 Brian Hayes)

SPACE-TIME ON A SEASHELL

Brian Hayes

We prize the pearl, but in many ways the more remarkable product of molluscan manufacturing is the shell. Seashells teach a geometry lesson on the variety of shapes that can be generated from a single basic form: the logarithmic spiral. Many shells also display intriguing decorative patterns on their surface. The stripes, wavy lines, chevrons, dots, triangles and other motifs are of particular interest to students of developmental biology and also to mathematicians and computer scientists. Although some of the patterns are quite elaborate, they are now understood in enough detail to reproduce their essential elements in computer simulations.

The modeling of shell forms and patterns is the subject of a new book, *The Algorithmic Beauty of Sea Shells (1)*, by Hans Meinhardt of the Max-Planck-Institut für Entwicklungsbiologie in Tübingen. This is the second volume in a series begun five years ago with *The Algorithmic Beauty of Plants (2)*, by Przemyslaw Prusinkiewicz of the University of Regina in Saskatchewan and the late Aristid Lindenmayer. Prusinkiewicz is the series editor, and he also contributes a chapter to the seashell book (in collaboration with Deborah R. Fowler, now of Hi Tech Toons).

In the earlier volume on plants, the algorithms chosen to describe the ramified structures of roots and stems and leaves were mostly based on recursive grammars, which model growth through the repeated application of transformational rules. Meinhardt's treatise on seashells draws on a quite different suite of mathematical tools, namely differential equations describing the creation, decay and diffusion of chemical factors that can either enhance or inhibit pigmentation. Meinhardt's mathematics is continuous where Prusinkiewicz's was discrete; Meinhardt's models are closely tied to details of biochemistry and physiology where Prusinkiewicz's were more abstract. And yet the two books share an important philosophical principle: They suggest that the way to understand a pattern in nature is to re-create it in a simulation. Meinhardt's book comes with software capable of reproducing all the simulations he discusses (and many others as well).

Growth at the Margin

Here is the most important thing to know about the pattern on a mollusk shell: It is a two-dimensional record of a one-dimensional process. The shell grows along one edge only, where material is laid down by a row of cells at the margin of the animal's mantle. Pigment deposited at the growing edge forms patterns that (with few exceptions) are never altered thereafter. If you could unroll a shell and flatten it out into a rectangle, the pattern would form a space-time diagram, with position in space measured along one axis (say from left to right) and sequence in time recorded along the other axis (from top to bottom). A physicist would look at the flattened shell and call it a Feynman diagram; lines within the pattern are "world lines," tracing the entire history of motions through space.

Given this generating mechanism, some shell patterns are easy to understand. A series of vertical stripes—that is, stripes running perpendicular to the growing edge—implies a static distribution of pigment-secreting cells in the mantle margin. Where a cell or a group of cells is permanently turned on, there is a dark stripe of pigment, and where the cells are dormant, there is an unpigmented space. The complementary pattern—horizontal stripes, parallel to the growing edge—results from a temporal rather than a spatial oscillation. All the secretory cells switch off and on in synchrony, so that light and dark bands are left behind on the surface of the shell as the growing edge moves on.

An oblique stripe records the passage of a traveling wave of excitation in the row of pigment cells. Each cell is stimulated to a brief pulse of pigment secretion; then, as the cell's own activity fades, it passes the excitation along to a neighboring cell. The slope of the resulting line indicates the velocity of the traveling wave: The steeper the slope (that is, the more nearly vertical), the slower the wave. Shells with a complex pattern of oblique lines can look very much like the physicist's idea of a space-time diagram. In some cases the diagonal lines are created in pairs, like electrons and positrons, with one line propagating to the left and the other to the right; furthermore, lines moving

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in opposite directions annihilate each other when they meet, just as matter and antimatter do.

The study of pattern formation in living organisms has long been one of the more mathematically sophisticated areas of biology. D'Arcy Wentworth Thompson set the standard in his thousand-page survey *On Growth and Form* *(3)*, which included an extensive discussion of seashells. Alan M. Turing is known as a pioneer of computer science, but in 1952 he published a paper on biological morphogenesis *(4)* that is still taken seriously today. In 1969 C. H. Waddington (a biologist) and Russell J. Cowe (a computer scientist) collaborated on a computer simulation of certain mollusk-shell patterns *(5)*. A few years later, computer studies of one-dimensional cellular automata *(6, 7)* yielded patterns that were strikingly reminiscent of shell pigmentation.

Hans Meinhardt reports that his interest in shell patterns was aroused during dinner at an Italian restaurant, when he noticed a shell bearing W-shaped red lines. "To my surprise," he writes, "it seemed that the mathematical models we had developed to describe elementary steps in the development of higher organisms were also able to account for the red lines on my shell." Meinhardt's earlier work (done in collaboration with Alfred Gierer) had focused on fundamental events in biological development and differentiation, such as the emergence of "polarity," or spatial orientation, in the embryo. The primary tools for understanding these events were differential equations describing gradients and fluctuations in chemical concentration. Now he found that the same equations could generate shell patterns as well.

Activators and Inhibitors

The root idea from which Meinhardt's models spring is the interplay of activators and inhibitors: substances produced in the pigment cells and also acting on those same cells. Specifically, he considers a hypothetical activator molecule that promotes not only pigment production but also its own synthesis—that is, the more activator is present in a cell, the more the cell makes. This positive feedback loop is kept in check by an inhibitor, whose synthesis also depends on the activator concentration. The rates of synthesis, decay and diffusion of the activator and the inhibitor determine the pattern generated as the shell grows. Small changes in these rates can cause major reorganizations of the pattern.

Suppose the inhibitor diffuses much more rapidly along the mantle margin than the activator does. Under these conditions, if a small group of cells has a slightly higher activator concentration than its neighbors, the disparity will increase still further as the activator enhances its own production. The inhibitor will also be made copiously in these cells, but it will diffuse away and spread its effect over a wider area; as a result the neighboring cells, where activator levels were already low, will be further suppressed. In this way random spatial variations

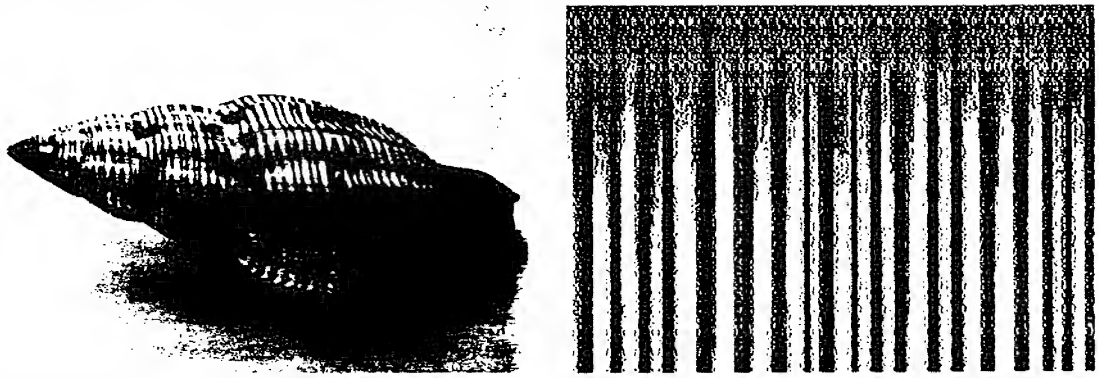

Figure 1. "Vertical" stripes, perpendicular to the growing edge of a mollusk shell, result from a stable spatial pattern of alternating active and dormant pigment-secreting cells. In the simulation *(right)* the pattern emerges spontaneously. The shell *(left)* is a specimen of *Lyra taiwanica*. (All photographs courtesy of Hans Meinhardt.)

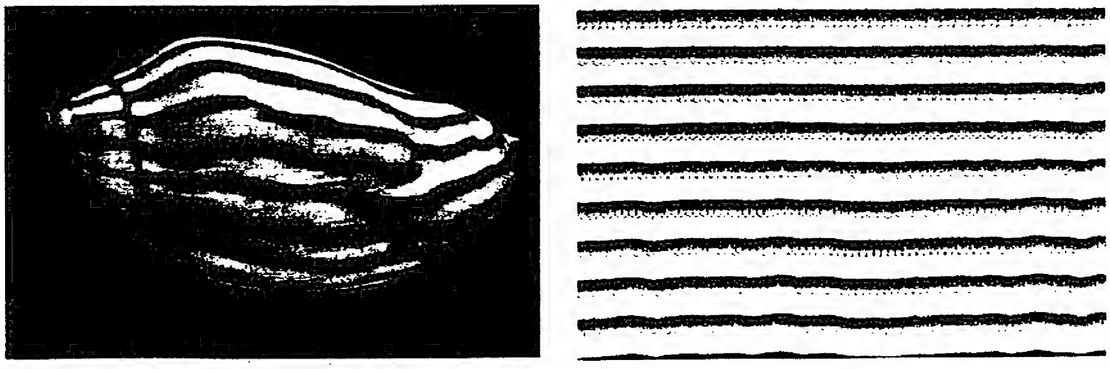

Figure 2. "Horizontal" stripes, parallel to the growing edge, reflect a temporal oscillation in pigment-cell activity. in which all the cells turn on and off almost simultaneously. The shell is *Amoria dampieria*.

in activator concentration and pigment production are amplified and then become "frozen in," remaining stable over long intervals. In other words, the mollusk creates a shell with vertical stripes.

The temporal oscillations that give rise to horizontal stripes can also be explained by a model of this kind. If inhibitor production lags behind activator production, the delay allows the activator to overshoot its equilibrium level. When the inhibitor eventually catches up, it also overshoots and thus deeply suppresses activator output. Now the inhibitor level also falls, and so the activator begins to recover. The cycle repeats indefinitely with a period determined by the rates of synthesis and decay.

One way of forming oblique lines is with an activator that diffuses faster than the inhibitor. When a single cell becomes spontaneously active, the diffusion of the activator molecule soon turns on the two adjacent cells (to the left and the right). Meanwhile, the buildup of inhibitor in the central cell shuts down pigment production there and leaves the cell in a refractory state where it cannot be stimulated again for a time. The neighboring cells eventually meet the same fate: They pass on the wave of activation to the next cells in line as their own activity is extinguished. The record of these events on the surface of the shell is a Λ-shaped pair of lines radiating from the site of the first excitation.

When two of these traveling waves collide, there is a further interesting consequence. A wave can survive only by continually invading fresh territory, or in other words by moving into cells that have not been poisoned by an accumulation of inhibitor. But an eastbound wave has nowhere to go when it meets a westbound wave. The cells in the wake of each wave have been left in the refractory state, so that the wave cannot reverse direction; nor can it continue ahead because the cells there have been poisoned by the oncoming wave. Hence both waves are annihilated in a V-shaped vertex.

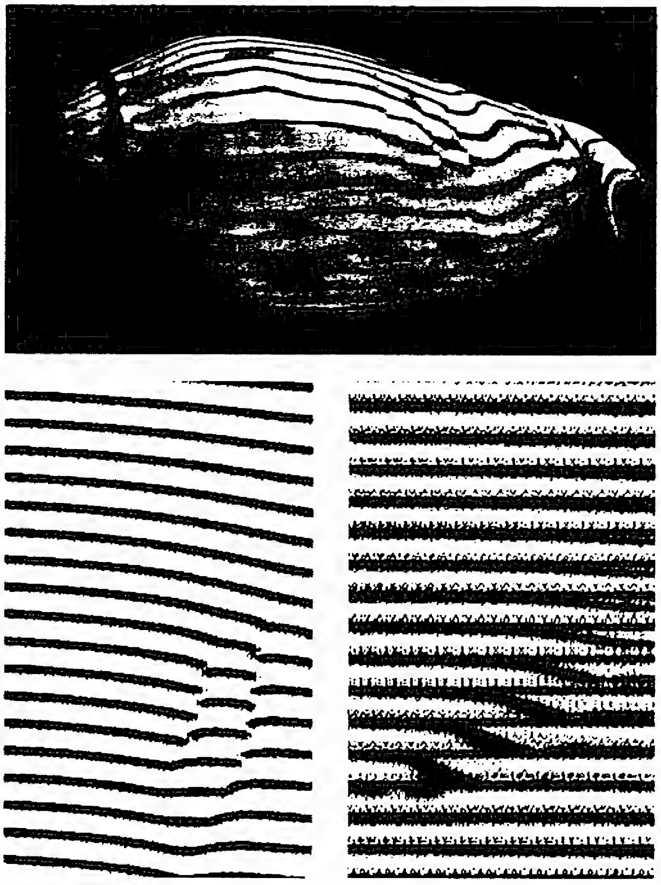

Figure 3. Dislocation in the striped pattern of *Amoria turneri (top)* is a challenge to the simulation scheme. A single oscillator whose frequency varies across the width of the shell *(left)*, produces several discontinuous stripes, whereas the natural pattern is quickly resynchronized. Adding a central hormonelike oscillator (shown here in green, although its actual products are presumed to be invisible) yields a more realistic output *(right)*.

Imperfections and Irregularities

Concocting models to account for the most conspicuous features of these patterns is not really difficult. The simplest cellular automata will do nicely for creating stripes at any rational slope between vertical and horizontal. Such models dispense with all the messy chemistry of activators and inhibitors. They require only abstract computational "cells" that make transitions from one discrete state to another according to straightforward rules.

Meinhardt's aim, however, goes beyond modeling the rudiments of a few selected shell patterns. The goal is to devise a coherent set of biologically plausible models that can account for *all* shell patterns—or at least as many as possible. Moreover, the models should reproduce not just the gross outlines of the patterns but also the minor imperfections and irregularities, which can be very revealing of underlying mechanisms. (Isn't it ironic that what distinguishes the artificial from the natural is too much perfection?)

The shell of the gastropod *Amoria turneri* has horizontal stripes that tend to remain straight and parallel even though the diameter of the shell varies along the shell's length. In the fatter, middle, part of the shell, there might be ten stripes inserted during a certain period of growth, but toward the tapered end only nine stripes are created in the same interval. Somewhere between these two regimes there must be a discontinuity, like a dislocation in a crystal lattice. Inspection of the shell reveals that the disturbance caused by the mismatched stripes is confined to a small region both spatially and temporally. Meinhardt writes: "Attempts to simulate this phenomenon turned out to be more difficult than expected.... If a diffusing inhibitor is involved in the synchronization, line termination can occur due to lateral inhibition.... However, the resulting pattern differs substantially from the natural pattern. It requires several oscillations in the zone of conflict before synchronization is re-established."

Meinhardt's tentative solution to this puzzle is to postulate another oscillating chemical system, in addition to the pigment-secreting one. The substances forming the second oscillator are distributed globally throughout the mollusk's tissues in a "hormonelike" way, meaning that they can transmit signals

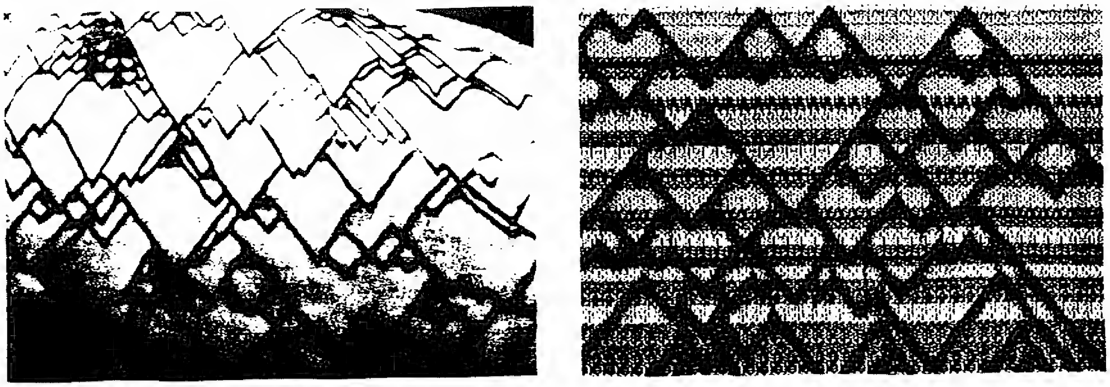

Figure 4. Oblique stripes on *Oliva porphyria (left)* record the passage of traveling waves in the line of pigment cells. The stripes are created and annihilated in pairs, like particles of matter and antimatter. To account for the frequent synchronization of creation events, the model *(right)* includes a global hormone-like signal *(green)*. A larger sample of the output of this simulation, without the green hormone, is shown on the cover of this issue.

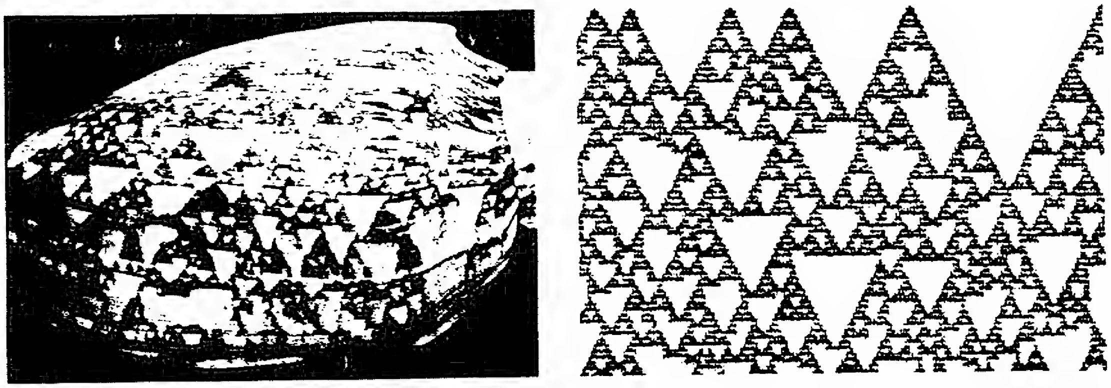

Figure 5. Triangular pattern on *Cymbiola innexa Reeve (left)* also suggests the presence of some synchronizing mechanism, since many secreting cells must shut off at once to form the upper edge of a white triangle. In the simulation *(right)* another global signal is introduced for this purpose.

faster than any substance moving by simple diffusion. The second oscillator can therefore serve as a master clock, keeping distant cells synchronized. The frequencies of the two oscillators are close enough that the pigmentation system becomes entrained by the hormonal oscillator as long as the phase difference is not too great; then, when an adjustment is needed, the pigment-secreting oscillator "skips a beat" and quickly resynchronizes Simulations based on this model more closely match the pattern observed on real *Amoria turneri* shells.

Parsimony and Elegance

Introducing an entire system of chemical oscillators just to explain one anomalous detail on the shells of one mollusk species offends against the principle of parsimony. The hypothesis of a hormonelike pacemaker begins to seem more plausible, however, when Meinhardt finds evidence of similar mechanisms at work elsewhere. A case in point is the shell of *Oliva porphyria*, one of the most treasured finds of tropical shell collectors and also one of the favorite subjects of mathematical shell modelers. The shell of *O. porphyria* is distinguished by oblique lines that have frequent branch points, which implies that in the row of pigment-secreting cells a wave of excitation moving to the right can suddenly spawn a backward wave moving to the left (or vice versa). What is more, the branch points are often correlated over long distances: When one line branches, there is a good chance that others will also branch at about the same time. Meinhardt's global control element could explain this long-range synchronization.

The central clock is seen yet again in shells decorated with triangle patterns, where a pigmented region begins at a single point and grows steadily wider until all of the pigment-producing cells suddenly shut off at the same time. "The sharply straight lower edge of triangles indicates that termination occurs strictly simultaneously. This excludes the possibility of a signal being initiated at a particular position and spreading by diffusion."

The appeal to a master timekeeper, and the assertion that such a central authority is needed for long-range synchronization, brings up a curious cultural issue—a question of differing intellectual habits and biases among the tribes of science. For the developmental biologist, it seems, proposing a new chemical oscillator is a natural and perhaps obvious way of solving a problem. A mathematician or computer scientist working on the same puzzle—how to coordinate the activity of many distant cells—might well be tempted by a different kind of explanation. In particular, someone immersed in the tropes and idioms of computer science would not be so quick to dismiss the possibility of synchronizing a row of cells with a signal that spreads by diffusion.

One of the standard exercises of computer science is called the firing-squad problem, which asks how a group of soldiers without a leader can arrange to fire their weapons simultaneously. A number of ingenious solutions have been worked out, involving multiple signals passed up and down the line and forming intricate fanlike patterns as they reflect and propagate. The problem was originally intended to illuminate some of the difficulties of synchronizing the multiple processors of a distributed computing system, but the solutions can clearly be applied to the synchronization of seashell patterns as well. Indeed, G. T. Herman and W. H. Liu propose a firing-squad mechanism for shells with triangle patterns *(6)*.

Which scheme is to be preferred—the extra biochemistry of a master oscillator or the computational complexity of a firing-squad algorithm? By mathematical criteria, the firing-squad solution might well be judged the more elegant, if only because it accomplishes the task with fewer resources. But the central oscillator has biological plausibility and precedent on its side. "Inelegance," Meinhardt writes, "is an aesthetic problem only for theorists." Nature often seems blandly content with the ugly answer that works.

Many more shell patterns are studied and simulated in these pages, including some where dual oscillators are unquestionably present, since they both leave visible trails. But I must leave off describing shells in order to leave room for illustrating a few of them.

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NEW CURATOR FOR AMNH SHELL COLLECTION

After a summer without direct leadership, molluscan activities at the American Museum of Natural History again have a guiding hand. Although the position of department head remains to be filled, the volunteer staff of catalogers, identifiers and shufflers has been led, since early November, by the newly arrived Yae Ri Kim.

Yae Ri (it rhymes closely with Mary) came to the museum from a considerable distance - but in stages. She was born in Seoul, Korea. From the age of two through her high school years, home was Oahu, Hawaii. For college she chose the University of Southern California at Los Angeles. She graduated with a BS in biology, with emphasis on marine biology. Her minor was bioethics. Then it was on to Georgetown University, for a masters in physiology (August '95).

Yae Ri has been a shutterbug since she was 12. Her favorite subject, she says, is faces. At present, though, her preoccupations are her new work and settling in to Jersey City, N.J. (home base) and New York. Getting acclimated and adjusted is very much a solo adventure, since she has no family in the U.S.

The members of the Club welcome Yae Ri, and look forward to a long and mutually rewarding association.

Milton Werner

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SCHEDULE OF MEETINGS

1995 - 1996

PLEASE NOTE: There may be differences in the dates and/or places for meetings from those given below. Consult the current issue of N.Y.S.C. NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

September 10, 1995
October 8, 1995
November 12, 1995
December 10, 1995
January 14, 1996
February 11, 1996
March 10, 1996
April 14, 1996
May 12, 1996
June 9, 1996

Meetings are held at the American Museum of Natural History, Room 319, Central Park West at 79 Street, New York City, starting at 2 P.M. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying the Museum admision fee by presenting your New York Shell Club membership card.

NOTE: NEW YORK SHELL CLUB pins are available;

$3.50 at a meeting; $4.00 by mail

(Mail orders should be sent to
Theta Lourbacos, 66 W. 94 St., Apt. 20C
New York, NY 10025)

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September to June, in Room 319 of the American Museum of Natural History, New York City (unless otherwise notified). On meeting days your NYSC membership card will provide admission to the Museum for you.

PROGRAM SCHEDULE

SUNDAY, March 10, 1996	2:00 PM	SWIMMING WITH THE MANATEES talk and video, Linda Kogin
SUNDAY, April 14, 1996	1:00 PM	ANNUAL NYSC SHELL AUCTION details with auction list will be mailed about the beginning of April
SUNDAY, May 12, 1996	2:00 PM	LIVE HERMIT CRABS talk and video, Linda Kogin
SUNDAY, June 9, 1996	2:00 PM	ANNUAL MEETING: Election of 1996-7 officers

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HIGHLIGHTS OF RECENT MEETINGS

December 10, 1995. Romuald Czepulkowski reported that Mr. Kayman's shell collection was obtained from Mrs. Ruth Kayman, West Hempstead, N.Y. Although about 80% of the collection is without data, the size and quality of the collection make it valuable. Carl Ehrlich thinks it is worth a few thousand dollars; Carl and Romuald will make a list of the shells with estimates of their values.

Henry Gordon offered a brief tribut to Dr. R. Tucker Abbott, saying that no one has done more for malacology than he, and that his name should be perpetuated. Henry is planning an article on Dr. Abbott for NYSC NOTES.

Ed Cowles drew attention to an organization in Mexico called "Especies en Peligro A.C." It is concerned for protection of endangered species. The letter asks for help in building a library, and it was suggested that we might contribute some of the technical papers recently donated to the Club by Dr. Edward Dunlap.

Ed also mentioned a letter from Carole Marshall, V.P. of the Broward County Shell Club, requesting a letter from us to the Florida Keys Marine Sanctuary, Marathon Florida, urging that mollusks be exempted from the State's restrictions on fishing. Ed said he had written and sent such a letter.

The program for the day consisted of two video tapes, "CEPHALOPODS" and "MOLLUSKS". Door prizes were Muricanthus radix, won by Nick Katsaras; Conus purpurascens, won by Romuald Czepulkowski; Fascolaria lilium Hunterei, won by Mark Shapiro.

January 14, 1996. Ed Cowles reported that discussion among himself, Al Scarpetti, Carl Ehrlish and Romouald Czepulkowski had convinced them that a separate auction of the Kayman collection of volutes would not be the best way to offer them for sale. It was decided that they would be included in the Club's annual auction.

New member Juan Rivera Olivo was introduced.

The program, titled "Texas Shelling," was a showing of the slide show, with audio cassette, created by the Louisiana Malacological Society. The shells shown and described were the fruits of bottom-collecting about 15 miles off the Texas coast and collecting from the legs of offshore oil rigs.

Mark Shapiro suggested that we try to reach Michael Kauffman, writer for the New York Times, in the hope that he would do a story on the Club. Al said that he will invite Mr. Kauffman to a meeting.

February 11, 1996. Carl Ehrlich and Romouald Czepulkowski reported on their handling of the Kayman volute collection. Each has taken responsibility for about half of the shells, undertaking the tasks of listing them for subsequent auction and estimating their values for Mrs. Kayman's report to the IRS.

In discussing preparations for the April auction, it was agreed that coffee, cakes, snacks and various drinks will be provided, rather than the more elaborate 'refreshment tables' of past years.

New member Philip Tates was introduced.

The program was a showing of slides from the extensive body of work amassed by the late George Raeihle, an avid and extremely expert photographer. The category chosen for the program, with the help of Dorothy Raeihle, was "Shells in Advertising." Over the years, George had photographed every advertisement that he could lay hand on that showed a shell or shells. These dozens of slides make a vivid visual display.

Milton Werner, Secretary

COMING ATTRACTIONS

The NYSC Annual Social and Auction will be held on Sunday, April 14, at Dorothy Jensen's Broadway Dance Studio, 31-08 Broadway, Astoria, Queens. We welcome all donations of specimen shells, shell books, and shell-related items, to further enhance the interesting selections already on hand. Your attendance and donations are most appreciated because funds realized at the auction are needed to cover the cost of routine operations and the printing of our quarterly NYSC NOTES. We need, also, volunteers to provide refreshments and to help before and during the auction. Arrangements will be discussed at the March 10 meeting. As in past years, a list of auction items will be mailed to local members and friends at the beginning of April.

The Long Island Shell Club has announced a shell show for Saturday, April 20, and that NYSC members are invited to enter exhibits. It will be non-competitive, and there will be no restrictions on exhibits. Show hours will be 10 A.M. to 5 P.M. The location will be the North Bellmore Library. Those coming via the LIRR can make arrangements to be met by car by calling Mel Springer (516-785-8211) as far in advance as possible.

Jun. 23-27 Western Society of Malacologists Annual Meeting
San Diego, California
Hugh Bradner, 1867 Caminito Marzella
La Jolla, CA 92037 (619) 459-7681

Jun. 29 - Jul. 3 American Malacological Union Annual Meeting
Chicago, Illinois
Rudiger Bieler, Div. of Invertebrates
Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605 (312) 922-9410 ext. 270

Jul.15-19 Conchologists of America, Inc. 1996 Convention
Tradewinds Resort, St. Petersburg Beach, FL
Membership Chairman; Barbara Houchin
2644 Kings Highway,
Louisville, KY 40205 (502)348-5719

DOWN ON THE FARM

by Bill Belleville

reprinted from DESTINATION DISCOVERY, April, 1995

There is pandemonium at the Queen Conch Farm this afternoon. A killer is on the prowl, and the remains of its victims lay at our feet under seven feet of clear seawater.

"Look down," says Chuck Hesse, the head conch farmer, who is treading water in skindiving gear, "and you will come face to face with death." Hesse is only half kidding.

I peer through my mask to the sandy bottom. Shards of pink and amber and white shell gleam back at me in the late afternoon sun, sure signs of a mollusk crushed to smithereens.

"There's a predator loose here, somewhere," says Hesse, raising his head from the water and looking over his shoulder, as if it might still be nearby, ready to pounce.

A predator to a conch--spiny lobster, box crab, tulip shell--is of little danger to you or me. Unless, of course, you happen to have a stake in the survival of the 1.5 million conch (pronounced konk) ensconced here in the Turks and Caicos Islands on the world's first commercial farm of Strombus gigas. And Hesse, who has devoted a decade of his life and $7 million of investors' money in that quest, surely has a stake. So, too, should anyone who cares that wild stocks of conch are now vanishing from the sea because of overfishing.

We sink back underwater. A small gold and blue damselfish flits in and out of a hunk of black sponge atop a hard bottom of sand and seagrass. Flat-top bristle bush plants are scattered about like teensy trees. A green moray peaks out from the end of a discarded section of hard plastic pipe, cautious. Everywhere, conch are grazing like aquatic sheep, their trunk-like mouths stretching out from under their large pink shells, quietly slurping algae bits from the sand and grass.

If this sea farm has certain links to husbandry back on land, it's no coincidence. After all, the giant, snail-like gastropods are born, raised, and harvested like terrestrial livestock. But there are marked contrasts with cows and chickens--not the least of which is the reality that the "Caicos Conch Farm" is situated in our last global frontier, the ocean itself, on an island chain some hundred miles north of Haiti.

Life here is both flavored by the marine environment and at the mercy of it. Tropical storms, newly emerging mariculture science, and the whimsical uncertainty of tropical island life and politics all influence survival, for both conch and conch farmer.

"This is all like a floating opera," says Hesse, referencing John Barth's dark comic novel by the same name. "If you stand here in one place long enough, all the pieces of the plot will pass by, and you'll finally understand what's going on."

On a late winter morning, Hesse is commuting to work on Providenciales Island, bouncing along in a dusty red dune buggy, top down and warm air whipping through his hair and beard. He is barefoot, wearing a flowered shirt and shorts, and has a battered briefcase wedged down behind his seat--more conch cowboy than farmer. The land he drives over is ancient coral reef, now compressed by time into low-profile limestone hills and swales. Educated at the U.S. Naval Academy as an ocean engineer, Hesse worked aboard nuclear subs before taking early retirement to find out how the ocean was really engineered. In 1973, he sailed eastward across the Caribbean in a self-built wooden sloop, aiming to do field studies on the queen conch in Barbados. Along the way a tropical storm chased him to safe harbor in the Turks and Caicos, a Britich Crown colony he didn't know existed. When the sun reappeared, Hesse found himself surrounded by conch. And so, he stayed.

Providenciales--Americanized as "Provo"--is the largest and most populated of this eight-island archipelago. Until the mid-sixties, it consisted of three tiny villages where locals fished and farmed subsistence vegetables. Without electricity, roads, or airstrip, Provo existed as it had the last century or so, with native fishermen sailing out to the nearby reef and shallow banks in small,hand-built boats. There, leaning over the gunnels, they hooked conch and lobsters and sponges using long wooden poles with iron shanks on the end.

The outside world has since arrived on Provo. On his fifteen-minute ride, Hesse passes an eighteen-hole golf course, a 230-room Ramada, the heavily guarded entrance to a Club Med, and the upscale Grace Bay Club, where suites bottom out at $700 a day in the high season. Resort developers have grafted entire south Florida landscapes onto the maritime terrain, importing non-native date palms and bright shiny grasses, which they keep alive with desalinized seawater.

But Hesse also passes The Bight, a native fishing village where modest wood and block homes in pastel colors crowd up to the edge of a limestone bluff overlooking the green-blue sea. Surrounding the little cottages are entire tracts of wild natural flora, endemic island-hardy plants like the stunted silver palm, lignum vitae, sea grapes, and tamarind that require no outside investment to sustain. Elsewhere, in the isolated fishing villages of Blue Hills and Five Cays, it is largely the same. Native families still persevere here with the surnames of the British planters--Stubbs, Gardner, Williams--who brought them here as slaves after the American Revolutionary War.

Closer to the conch farm, the asphalt turns to limestone rut and rubble. Finally, a lone wooden sign with cartoonish conch shells on it announces the entrance to the farm itself.

To a casual observer, it might seem Hesse has history on his side in the area of aquaculture. A Chinese how-to treatise, "Fish Breeding," dates to 475 B.C., and the farming of freshwater catfish, crayfish, and trout are assembly line-like operations in the U.S. today.

But the ocean isn't always as generous with its gifts: The business of commercially growing saltwater animals--despite success stories like penaeid shrimp, salmon and bay scallops--is still under development. Marine species simply live more complicated lives, often transmuting through a variety of larval stages after birth. More to the point, they live in the ocean, a medium that--even with the advent of the aqualung and the advancement of marine science over the last half century--we have only begun to understand.

Inside his tiny office, next to the rusting file cabinets and the dripping wetsuit, where the trade winds waft in from the ocean through the battered screen door, Hesse reflects on his relationship with Strombus. "They say it takes fifteen years to bring a species into commercial mariculture production," says Hesse. "I'm a little ahead of the game."

Although the queen conch wasn't fully described by scientists until the 1960s attempts to grow it got underway not long afterward. One of the pioneer mariculture labs was on nearby Pine Cay, funded by a charitable foundation Hesse set up soon after his arrival. Its goal was nothing less than to use mariculture and non-polluting renewable energy--wind generators--to help establish a marine "biosphere reserve." In an era of unabashed earnestness, Hesse called it PRIDE--Protection of the Reefs and Island from Degradation and Exploitation--and no one even flinched.

Flush with a handful of grants and a growing membership of mostly affluent yachties, Hesse's PRIDE became the backdrop for key conch mariculture work by committed young scientists--most notably Megan Davis, who later became president of the Caribbean Mariculture Association--that formed the template for today's operation.

At the conch farm today, there is a hatchery, a post-larval "nursery" for young animals, and a "grow-out" for larger ones, standard methodology for most mariculture. But there are also some wonderful stylistic quirks, as unique as the animal itself.

As form follows function in the creation of the conch shell--the conch absorbing and then shaping calcium carbonate it extracts from seawater--so it does in the creation of the farm buildings. Cobbled together by local boatwrights, they appear as a fleet of oddly shaped arches, domes, silo-like turrets sealed from the elements with fiberglass and white marine paint, hulls up and tops down, topsy-turvy forever.

Inside them, baby conch are hatched in large vats and nurtured through a delicate three-week, free-swimming larval stage. After metamorphosis, they settle to the bottom as fully formed miniature conch about the size of pinheads, and then are transferred to shallow, sand-filled trays where they're fed a special blend of algae. Outside, larger animals graze in circular concrete ponds, feasting on a special fish/plant blend of "Conch Chow" pellets that workers toss to them by hand. All are nourished with dissolved oxygen via the endless pumping of seawater.

Older conch, the ones with shells strong enough to survive most predation, get tossed out into the fenced sixty-acre "pasture," which begins just beyond the sun-hardened limestone at the edge of the farm. "we kick 'em out the door at eight centimeters," says Hesse. "They have to go out and hack it with the big boys."

The shallow pasture itself lies beneath a stretch of vivid transparent seawater the color of lime gelatin. Studded with white posts and buoys, and walled with fishermen's nylon seines, it stretches from Boy Stubb's Cove to scenic tidal cut descriptively known as Leeward-Going-Through.

With the cascading sound of seawater, the odd, whimsical-looking assemblage of structures, ahd the ethereal lime-green "pasture"--all washed by the tropical sun and breeze--this customized queen conch farm seems more than just a place to raise animals for food. It appears almost drug-induced, maybe something conjured up in the last century by Lewis Carroll, or by Tom Robbins in this one.

Perhaps it's not surprising that, on Hesse's desk, where an anole lizard is currently hunting tropical bugs, there is a Robbins novel in which a queen conch plays a major role. Robbins has written of Strombus: "A house exuded by the dreams of its inhabitant, it is the finest example of the architecture of imagination, the logic of desire....It is a bonbon pink, a tropical pink, above all a feminine pink. Colored by the moon, shaped by the primal geometry, it is the original dreamboat...."

ASIAN VOLCANO SAID TO DAMAGE RED SEA CORAL

reprinted from N.Y. TIMES, October 13, 1995

A team of scientists in Israel has found evidence that a 1991 volcanic eruption in the Philippines severely damaged a coral reef under the Red Sea, some 6,000 miles away.

According to a report published yesterday in the British journal Nature, an extensive growth of algae that killed live coral formations in the Gulf of Aqaba in 1992 resulted from biological events that followed the 1991 eruption of Mount Pinatubo.

Other studies have shown that the millions of tons of debris injected high into the atmosphere by the eruption changed wind patterns in the upper atmosphere and hence weather patterns around the world.

According to the new study by Amatzia Genin and Boaz Lazar, of the Hebrew University in Eilet, and Stephen Brenner, of Israel Oceanographic and Limnological Research in Haifa, cooler air chilled the normally warm surface waters in the gulf, inducing them to begin mixing with colder waters as deep as 2,500 feet below the sea.

Deep waters tend to be rich in dissolved nutrients like nitrates and phosphates, which, because they remain far from the reach of sunlight, go unused by organisms. But once mixed upward into bright waters where aquatic plants can thrive, the nutrients acted as fertilizers, promoting explosive algae growth.

According to Dr. Genin, the resulting clouds of algae blocked the transmission of sunlight to the gulf's extensive coral reefs.

Within a year, the algae killed more than one-fifth of the branching corals and more than 75 percent of so-called "mushroom" corals.

"We were really stunned that coral in the gulf in front of our office could be sensitive to a volcanic eruption thousands of kilometers away," Dr. Genin said, who also noted that with recent warmer temperatures the waters have cleared and the coral has begun to recover.

The new search suggests that scientists may be able to use this data to help reconstruct the history of past climate fluctuations.

HUMILARIA KENNERLYI SURVIVES DRILL ATTACK

ROLAND C. ANDERSON

The Seattle Aquarium, 1483 Alaskan Way,
Seattle, Washington 98101

I have been intrigued by the Kennerly's Venus clam [*Humilaria kennerlyi* (Reeve, 1863)] for a long time (see Anderson, 1985; 1994). Recently, I found one of these thick-shelled clams that emphasizes its resistance to drilling. I was diving at Titlow Beach in Tacoma (Washington State, USA), a dive site popularized by the world octopus wrestling competitions held there in the 1960s (High, 1963). Although octopus wrestling is now no longer sanctioned or practiced, this site is still popular among divers. There are strong currents that sweep through the Tacoma Narrows, a stricture in Puget Sound, and divers can only dive on slack tides. The currents make for a rich bottom life. The substrate is composed of rock ledges and cobble/gravel. Numerous shells litter the bottom, including many *H. kennerlyi*. I spotted a particularly large shell and stuck it in my pocket.

Upon measuring the shell (103 mm by 77 mm) I noticed that it had an incomplete bore hole in it from a carnivorous gastropod (Figure 1). The cylindrical hole on top of the umbo is 6.0 mm deep and 2.3 mm wide, a remarkable depth for a drill hole. This is more than twice as deep as any drill holes noted by Williams (1976).

There is a thickening of shell material and a discolored area on the inside of the shell under the bore hole. It is not likely the clam could sense where the drill hole would penetrate the shell, therefore the hole must have pierced the shell before the clam could defend against it. After the snail had perforated the shell, the clam must have mounted a defense against it by laying down more shell material under the hole.

The snail must not have been able to complete its drill hole. Perhaps 6.0 mm was as deep as it could drill, or perhaps it became dislodged or "discouraged".

There are only three large snails in this area of southern Puget Sound that could have drilled so large a hole: *Polinices lewisii* (Gould, 1847), *Nucella lamellosa* (Gmelin, 1791), or *Ceratostoma foliatum* (Gmelin, 1791). *Polinices* bore a large beveled hole (MacGinitie & MacGinitie, 1968; Williams, 1976), so it seems likely that this hole was bored by a *N. lamellosa* or a *C. foliatum*.

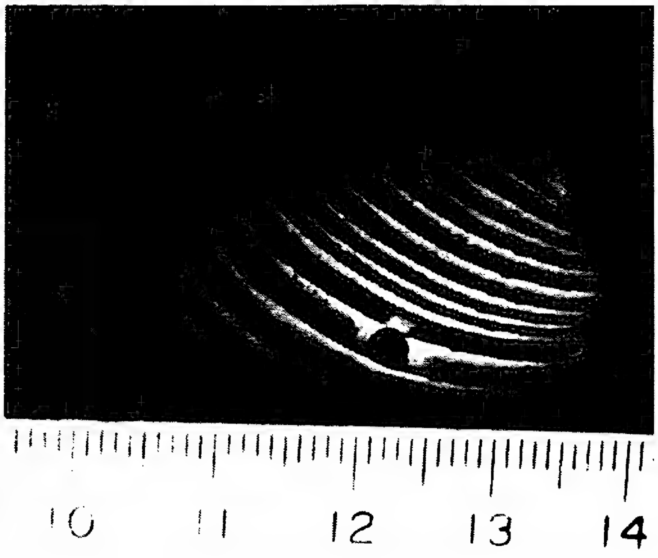

Figure 1. The drill hole into this *Humilaria kennerlyi* shell is 6.0 mm deep. Photo by Leo Shaw, The Seattle Aquarium.

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Full Membership $12.00 per year
Full Family Membership $15.00 per year
Corresponding Membership $10.00 per year
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The Treasurer-Membership officer should be notified promptly of any change of address.

NEW YORK
SHELL CLUB
INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

PLEASE NOTE: There may be differences in dates and/or places for meetings from those given below. Consult your current issue of NYSC NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

1996 - 1997

- September 8, 1996
- October 13, 1996
- November 10, 1996
- December 8, 1996
- January 12, 1997
- February 9, 1997
- March 9, 1997
- April 13, 1997
- May 11, 1997
- June 8, 1997

With the exception of this year's November and April meetings, (see NOTE below), meetings are held at the American Museum of NATURAL HISTORY, Central Park West at 79 Street, New York City, starting at 2 PM. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying the Museum's admission fee by presenting your NEW YORK SHELL CLUB membership card.

Please note the change in meeting room for our Fall meetings; the Museum is renovating our usual meeting room this Fall, so they have given us the Blum Classroom, 1st floor near the 77th Street entrance to the Museum. This applies to the September, October and December meetings--the November meeting will be the field trip to the Philadelphia Shell Show. Presumably Room 319 will be available for our 1997 meetings; the December NYSC NOTES will have further information.

NOTE: NEW YORK SHELL CLUB pins are availble; $3.50 at a meeting.

Mail orders should be sent to; ($4.00 by mail)

Theta Lourbacos, NYSC
66 West 94 St., Apt. 20C
New York, NY 10025

NEW YORK SHELL CLUB NOTES No. 339 June, 1996 Page 1

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September to June, in Room 319 of the American Museum of Natural History, New York City (unless otherwise notified). On meeting days your NYSC membership card will provide admission to the Museum for you.

PROGRAM SCHEDULE

SUNDAY, June 9, 1996	2:00 PM	ANNUAL MEETING: Election of 1996-7 Officers and Directors ART OF THE MAYAS, talk and slides, Edward Cowles
SUNDAY, September 8, 1996	2:00 PM	THE PINK SANDS OF ELEUTHERA, slides & tape, Dorothy Jensen

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Shellfish Most Commonly Involved in Human Poisoning,	Sylvia Dominey	9-10

We welcome contributions and suggestions from our readers and members - please send them on.

HIGHLIGHTS OF RECENT MEETINGS

March 10, 1996. The speaker was Linda Kogin, whose subject was the Florida manatee and the threats to its existence. It is estimated that there are only 1,500 left in North America, and they are being killed at an alarming rate. Most are killed by boats speeding through their feeding and gathering areas, and many by pollution. Florida's department of environmental protection is taking measures to protect these gentle creatures, but is thought by some to be dragging its feet. Linda's assessment is, "If people will slow their boats down, the manatee will survive." Of five species of these Sirenians, one has recently gone extinct - Stellar's sea cow. Florida's species is the West Indies manatee. They can't be reared in captivity because they must learn from their mothers how to live in the wild.

Linda accompanied her presentation with three video sequences. One was made when she snorkeled with the manatees in Florida's Crystal River. Another was the coverage by ABC New of the manatees' situation. The third, showing manatees in graceful motion, was made by the divemaster who was her guide. Linda distributed flyers produced by the "Save the Manatee Club."

Ed Cowles showed slides that he had made a number of years ago during visits to Vieques Island, off Puerto Rico, and to St. Lucia and Tobago. The photos covered both the scenery and the shells.

April 14, 1996. The 443rd meeting of the New York Shell Club was the annual auction, held April 14, 1996, at Dorothy Jensen's Broadway Dance Studio.

The doors opened at 11 a.m. and the auction started at 1 p.m., with Mel Springer as auctioneer and Romuald Czepulkowski and Carl Ehrlich as his assistants. In the 150-item list of shells and books that went on the block, the most notable segment was the large group of volutes that had been donated to the Club by Ruth Kayman. This extensive collection of fine specimens had been assembled by her late husband, Emanuel.

The outstanding offerings of the day were Nannamoria amicula, which was knocked down at $250; Voluta perplicata, $170; Lyria lyraeformis, $150; a second lyraeformis, $70; Cymbiolacca thatcheri, $65; Ericusa stokesi, $60; Conus crocatus, $53; Provocator corderoi, Teramachia tibiaeformis, Strombus goliath, Volutoconus hargreavesi and Volutoconus bednalli, all $50. A copy of "Cowries and Their Relatives of South Africa," by W. R. Litred, brought $50.

The unusually well-stocked sale table, with single shells and small bagsful priced from $1 to $10, was plucked almost bare early in the proceedings.

Coffee punch, cake and other snacks were available to fortify the avid bidders.

May 12, 1996. Treasurer Theta Lourbacos' report on the April auction confirmed the obvious: it was an outstanding success.

The speaker was Linda Kogin, whose subject was terrestrial hermit crabs, and especially their attractions as pets. She bought three of them four years ago and found them so enjoyable that she kept adding more. Despite giving many to friends, and donating some to the Bronx Zoo, she has had as many as 100 at the same time.

As pets they are easy to care for and feed, and are active movers and climbers. Linda says they also show individual personality traits. They can live for 15 years in a "crabarium," but can't reproduce because their eggs must be laid in the sea. She displayed some of the simple furniture that keeps them happy and healthy by giving them opportunities for exercise and providing supplemental food. They are omnivorous, and to make feeding even easier, pet dealers offer specially prepared food.

Linda showed a video made by dealers Charles and Linda Radl that explained how to set up a home for land crabs, going into such niceties as how to clean the shells that must be offered to them to grow into. They grow in a series of molts. As they form their new shells they replace any legs or eye stalks they might have lost in their occasionally rantipole activities. As a strong hint, Linda distributed sheets with the self-explanatory heading, "How to Care for Your Land Hermit Crab (Coenobita clypeatus)."

Milton Werner, Secretary

1996-7 PROPOSED SLATE OF OFFICERS AND DIRECTORS

Additional nominations will be accepted from the floor at the meeting.

President	Edward Cowles
Vice President	Lawrence Potter
Secretary	Milton Werner
Treasurer	Theta Lourbacos
Historian	Nick Katsaras

Directors:

Allen Aigen
Al Scarpetti

1996 SOCIAL/AUCTION - THANKS TO ALL!

Our 1996 Social/Auction was a big success - many excellent shells and books were auctioned and the Club's treasury benefited substantially. Many people gave their time, not only on Sunday, April 14, but many weeks before, preparing shells, doing the auction list and mailing, setting up the tables and studio for the auction, providing refreshments...

We thank the following for their contributions; the order has no relation to the size or type of contribution. If anyone has been left out, please let us know - the omission was not intentional.

Allen Aigen
John Cole
Edward Cowles
R.Czepulkowski
Carl Ehrlich
Denise Ehrlich
Irv Hoppenwasser
Dorothy Jensen
Leon Juster
Nick Katsaras
Ruth Kayman
Theta Lourbacos
Mal de Mer EnterPr.
Orcullo Shell Hse.
Mr.& Mrs.Don Pisor
Larry Potter
Arline Reimann
Hans Reimann
Al Scarpetti
Mark Shapiro
Mel Springer
Sylvia Springer
Mike Werner

1996 SUMMER & FALL - SHELL SHOWS AND MEETINGS

provided by DONALD DAN, COA AWARD CHAIRMAN

June 29 - July 3	Am. Malacological Union Annual Meeting, Chicago, IL R. Bieler, Div. of Invertebrates, Field Museum of Natural History, Chicago, IL 60605
July 13-14	Keppel Bay Shell Show, Yeppoon, Qld. Australia Jean M. Offord, 277 McDougall St. N. Rockhampton, Qld. 4701, Australia
July 14-19	COA Annual Convention St. Petersberg Beach, FL Bob & Betty Lipe, P.O. Box 49191 St. Petersberg, FL 33743
July 27-28	Townsville Shell Show, Queensland, Australia Glenda Rowse, 19 Farrell St. Kirwan 4814, QLD. Australia
August 9-11	Jacksonville Shell Show, Atlantic Beach, FL Judy Blocker, 102 Magnolia St. Neptune Beach, FL 32266
August 15-17	Jersey Cape Shell Show, Stone Harbor, NJ Jersey Cape Shell Club, P.O. Box 124 Stone Harbor, NJ 08247
September 7-8	Gulf Coast Shell Show, Panama City, FL Jim & Linda Brunner, P.O. Box 8188 Southport, FL 32409
September 13-22	Oregon Shell Show, Portland, OR Maxine Hale, 347 N.E. 136 Ave. Portland, OR 97230
September 21-22	International Shells & Fossils, Ottmarsheim, France Michel Rioual, 2 Rue des Vergers 68490 Ottmarsheim, France
October 5-6	Annual German Shell Fair, Eismar, Germany Vollath Wiese, Baderstrasse 26 23743 Eismar, Germany
October 26	British Shell Collectors' Club Shell Show, London Kevin Brown, 12 Grainger Road Isleworth, Middlesex TW7 6PQ, England
November 9-10	Philadelphia Shell Show, Philadelphia, PA Al Schilling, 419 Linden Ave. Glenside, PA 19038
November 15-17	North Carolina Shell Show, Wilmington, NC John Timmerman, 32 JEB Stuart Drive Wilmington, NC 28412-1700

HORSESHOE CRABS DWINDLE, AND BIRDS ARE ENDANGERED

Winged Migrants Need the Crab Eggs for Food

by Andy Newman

(extracts from THE NEW YORK TIMES, May 30, 1996 pages B1,B6)

REED'S BEACH, N.J. May 23 - As the tide goes out, the beach disappears beneath a blanket of birds, screaming and near starvation after flying nonstop for 4,000 miles from South America.

Around them are spawning horseshoe crabs: jumbo-sized, helmet-shelled relics of the Paleozoic Era, clacking against each other in the surf, forming amorous conga lines six or seven creatures long, turning the water cloudy with millions of milky-green eggs, getting flipped over by waves on the beach and writhing mutely as they die.

For 350 million years, the greenish-brown, spike-tailed horseshoe crabs - not crabs at all, but 10-legged arthropods closely related to spiders - have surged ashore every spring in a slow-motion mating frenzy. For the last few thousand years, they have gathered in greater concentration along the mucky shores of the Delaware Bay than anywhere else in this hemisphere, a fact that has not escaped the notice of the participants in the largest shorebird migration east of Alaska. The birds - more than a million sanderlings, red knots, ruddy turnstones and a few other species - each gobble up to 9,000 little green eggs a day for two weeks, doubling their weight before flying off to the Canadian tundra to nest.

But the spectacle that usually accompanies the high tides of the full and new moons in May has been muted along the bayshore for the last two years: the crabs' numbers have dropped sharply, posing a threat not so much to the crabs, who are found all along the Eastern seaboard as to the shorebirds, who have no other plentiful food source at this time of year to fuel their migration...

...state wildlife officials suspect that the main culprit may be overfishing by crabbers who dredge the creatures from the bay or simply pick them from the beach like fallen fruit, and sell them as bait for eel and conch traps...A half-dozen surveys of the bay's crab population over the last decade show widely varying numbers, from hundreds of thousands to more than four million. But all show a downward trend. And in the three years that the state has been requiring crabbers to report their catches, the harvest has jumped to 369,000 crabs from 252,000, due in large part to increased demand for eels in Japan and Europe...

Even a modest decline in the spawning population could spell trouble for the birds, because it takes a high density of crabs to make the eggs accessible. The she-crab deposits her eggs--up to 4,000 at a time--seven or eight inches down in the sand, out of reach of the relatively short-billed birds. When another crab comes along to lay in the same spot, she disturbs the first nest, pushing the eggs up toward the surface where the birds can get at them.

...For at least five feet out, the water, illuminated by powerful lights...was thick and churning with crabs. The young men stooped in the shallows, turning the crabs over to determine their sex. (Where the female has two extra claws, the male has a pair of hooks shaped like crooked fingers that he uses to latch onto the back of the female, or the male closest to the female. Crab eggs are fertilized in the nest, and the first male in line has the best chance of passing on his genes.) Females were tossed into plastic crates, males back into the bay.

...The female crabs, which at up to five pounds and a foot in diameter run double the size of the males, fetch 40 to 60 cents apiece from bait distributors...sell them to eelers for a dollar apiece. By dawn the crew had...1,880 crabs.

...The crab-dependent shorebird migration is the linchpin of the Cape May area's $10-million-a-year birding industry. Crabs are also important medically. A laboratory in Dias Creek, several miles down the coast from Reed's Beach, draws blood from the crabs--a process that does not harm them--to make a compound called lysate that is used to detect toxic bacteria on pacemakers, prostheses and other foreign objects that are placed in the human body.

...Lawrence J. Niles, the head of the nongame and endangered species program in the State Division of Fish, Game and Wildlife, said he doubted the state was being pessimistic.

"It looks to me," Mr. Niles said, that not only did we take correct action by restricting the harvest, but there is ample room to suggest that maybe we should be going further."

On the other hand, when the full moon reappears on June 1, the crabs might storm Reed's Beach again...

(continued from NYSC Notes, No. 338, March, 1996)

DOWN ON THE FARM

by Bill Belleville

reprinted from DESTINATION DISCOVERY, April, 1995

Catherine Dyer is a young British Biologist who grew up around a green turtle farm in the Cayman Islands, where her father was a marketing manager. Educated in marine science back in England, Dyer came to the conch farm six years ago to grow the algae used to feed the hungry young mollusks. It was not an insignificant chore; Twelve giant, six-thousand-gallon vats produce tons of bright green planktonic algae weekly during the peak growing season.

Today, Dyer, blond and tan from the sun, is production manager for the entire farm. In that role, she spends most of the day in bare feet and shorts, supervising a dozen native technicians and checking on the health and growth rate of her animals--often slipping into a wet suit and mask to monitor the herd in the pasture.

"It's a fascinating animal," says Dyer, of the giant marine snail. "I enjoy just watching it."

Strombus, as a meal or a shell, has proved to be eminently watchable. A major food staple in the wider Caribbean for centuries, it has also served duty as a cultural icon. Its lustrous shell was used by pre-Columbian Arawaks as both a horn and as a medium to carve 'zemis', homages to a minor god. In his journal, Columbus wrote of seeing shells as large as a "calf head." The British planters built their manor homes here of cut limestone blocks, mortared with the powdered shells of conch. Today, the Turks and Caicos have incorporated 'Strombus' into their official coat of arms, right up there next to the spiny lobster, between the two pink flamingos.

To illustrate the genesis of the conch, Dyer drags some scuba tanks out of a wooden shed on the dock at the farm's edge. "I'll show you where we usually get the eggs," she says, loading the dive gear into a small dory.

Islander Ricardo Forbes, twenty-one, who serves as assistant hatchery manager during the breeding season, joins us, and we head off for the nearby reef, some fifteen minutes away. With encouragement from steady northerly winter winds, whitecaps froth up over the reef line like meringue, making it an easy navigational target.

During spawning season, up to a thousand breeder conch were corralled out here, fenced in by the reef and a narrow bottom net just high enough to keep the mollusks from wandering off. Technicians like Forbes would routinely dive this site, gingerly collecting the newly laid egg masses from under female conch to fuel the hatchery back on shore--up to 400 thousand eggs in a single swipe of the hand.

Even though the site has been marked as "off limits" to divers, it is still under open sea and has been badly poached in the past. Both Dyer and Forbes doubt if more than a handful of conch remain; today's visit will confirm it.

Seagoing options for younger islanders like Forbes are increasingly tenuous, thanks to poor conservation. Countrywide, there are fewer than 150 working conch fishermen left, and they now use motor-powered boats and dive gear to take smaller, less mature animals, leaving fewer adults to restock the population. In turn, more and more islanders now seek service-related jobs in the burgeoning tourism industry as porters, dishwashers, waitresses. To native "belongers" like Forbes, the conch farm offers another choice, a spectacularly eccentric one perhaps, but one nonetheless with vital natural connections, unconfined by walls and the need for service with a smile.

As Dyer and Forbes lead me underwater today, they find the sandy sea bottom next to the reef virtually deserted, save for a Whitman's Sampler of gobies, damsels, angels, and grunts. Dyer's herd of breeders has been rustled, less for the three dollars-a-pound conch meat than the ten dollar price tag each shell fetches at the gift shop. This means they'll have to collect several hundred mature conch to restock the egg farm before the next spring breeding season.

As we fin out over the area, I spot one lone mature conch, its shell well camouflaged with marine plants, an oasis of life on the white sand. As I move in close, I see a set of beady, stalked eyes protruding through tapered shell grooves opposite a spiraled whorl. Mature, with its flared pink lip, the mollusk still carries the remnants of its earliest post-larvel shell at the tip of its spiral, ancient baggage forever in tow. It is, as Robbins has observed, "a calcified womb, a self-propelled nest."

Slowly, its massive black foot snakes out, gaining traction in the sand with its claw-like operculum. Suddenly, with a herky-jerky thrust it actually hops forward. 'Strombus' is on the move, searching for food, or perhaps fleeing the giant bubbling predator that hovers over it.

It is its muscular foot that is the conch's undoing. Skinned and pounded, it becomes white, seamless meat, tasting like abalone and sea scallop, tender as veal when fresh, twangy as rubber when frozen too long or poorly cooked.

I move my hand above its eyes, and the animal with the most advanced vision of all the mollusks quickly withdraws. I turn over its heavy shell and see an underside varnished smooth with new calcium. And, yes, Robbins is right again: The color is an astounding pink...a bonbon pink, a tropical pink...above all, a feminine pink.

Later, back at the farm, I watch as Dyer fills in as tour guide, shepherding a band of tourists from Club Med through the facility. And the cosmic, once more, comes face to face with the mundane. "Now I want you to tell me," demands a sunburned woman in plastic visor and fanny pack, "how in the world to you stuff all those things into those little shells?"

On a balmy Caribbean winter afternoon, the tropical sun bouncing off the water over Provo tints the thick cumulus a light but unmistakable mint green, a sky of marmalade.

Hesse, who spends far more time than he likes with administrative chores, is today making a snorkeling visit to a fenced subsection of the grow-out pasture. Here, some 150 thousand three-year-olds graze in aquatic bliss. "This is more than you'll find in the entire Florida Keys," says Hesse, referring to a once-rich environment now decimated by overfishing.

While thousands of pounds of farmed conch and shells have been sold, and millions of larval conch released to the sea over the last few years, the first large-scale harvest of seventy thousand four-year-old animals was delayed until this year. By 1997, the farm will produce one million animals a year--if the government approves a plan to expand the pasture by two hundred water acres. By then, a processing pla plant will have to be build on site just to clean all the conch.

Hesse is optimistic, but stoic. Elections in the country are upcoming, and political support for his expansion could waver. Even if it doesn't island life can be at once whimsical and capricious. In the early years, a fall hurricane blew the roofs off all his nursery buildings; another time, a small band of porcupine fish broke into the pasture and ate nearly twenty-five thousand young conch before workers could wrangle them. Just last year, a star-crossed technician, odd man out in a love triangle with a female employee, burned down the gift shop and education dome, as well as a nursery building with 300 thousand young conch.

"No one ever said farming conch would be easy," admits Hesse, grinning at his grand understatement.

With that, he sinks underwater, a solitary conch cowboy out riding the range, over his herd of bonbon-pink mollusks, under marmalade skies.

With summer and vacation beach trips planned by many, we reprint the following from CENTRAL FLORIDA SHELL NEWS with the hope that some unpleasant - or dangerous - injuries will be avoided.

SHELLFISH MOST COMMONLY INVOLVED IN HUMAN POISONING

by Sylvia Dominey

(Information copied from: "Dangerous Marine Animals" by Dr. Bruce W. Halstead)

1. Common Cockle, Cardium edule. inhabits European Seas.
2. White Mussel, Donax serra. inhabits South Africa
3. Gaper or Summer Clam, Schizothaerus nuttali. Found from Prince William Sound, Alaska, south to Scammons Lagoon, Baja California, and northern Japan.
4. Soft-Shelled Clam, Mya arenaria. Inhabits Britain, Scandinavia, Greenland, Atlantic Coast of North America, south to Carolina; Alaska, south to Japan, and Vancouver, British Columbia; California and Oregon coast.
5. Common Mussel, Mytilus californianus. Inhabits Unalaska, Aleutian Islands, eastward and southward to Socorro Island.
6. Bay Mussel, Mytilus edulia. Ranges from the Arctic Ocean to South Carolina, Alaska to Cape San Lucas, Baja California; practically worldwide in temperate seas.
7. Northern Horse Mussel, Volsellamoidiolus. Found along the Pacific Coast of America from the Arctic Ocean to San Ignacio Lagoon, Baja California; circumboreal.
8. Atlantic Jacknife or Razor Clam, Ensis directus. Ranges from the Gulf of St. Lawrence River to Florida.
9. Alaskan Butter Clam, Smooth Washington Butter Clam, Saxidormus giganteus. Ranges from Sitka, Alaska to San Francisco Bay, Calif.
10. Common Washington or Butter Clam, Saxidomus nuttali. Ranges from Humboldt Bay, California to San Quentin Bay, Baja California.

Three types of shellfish poisoning are recognized by physicians:

1. Gastrointestinal type - characterized by nausea, vomiting, diarrhea, and abdominal pain. This type usually develops about 10-12 hours after eating the shellfish, and is believed to be caused by bacterial contamination.

2. Allergic type - characterized by redness of the skin, swelling, development of a hive-like rash, itching, headache, nasal congestion, abdominal pain, dryness of the throat, swelling of the tongue, palpitation of the heart, and difficulty in breathing. This type probably results from a sensitivity to shellfish on the part of the individual.

3. Paralytic type. This last type is caused specifically by the dinoflagellate poison present in shellfish. The disease has also been termed paralytic shellfish, clam, mussel or/gonyaulax poisoning. The early symptons are a tingling or burning sensation of the lips, gums, tongue, and face, which gradually spreads elsewhere to the body. The tingling areas later become numb, and movements of the muscles of the body may become very difficult. Other symptoms frequently present are weakness, dizziness, joint aches, increased salvination, intense thirst, and difficulty in swallowing. Nausea, vomiting, diarrhea, and abdominal pain are relatively rare. The muscular paralysis may become increasingly sever until death ensues.

Inhalation of toxic products contained in windblown spray from red tide areas of Gymnodinium breve may cause irritation of the mucous membranes of the nose and throat, resulting in coughing, sneezing, and respiratory distress.

Treatment: There is no specific treatment available for paralytic shellfish poisoning and no known antidotes. Evacuation of the gastrointestinal tract should be instituted as soon as possible if shellfish have been ingested. Vomiting can be stimulated by swallowing large quantities of salt water, egg white, or merely by placing one's finger down the throat. Alkaline fluids such as a solution of ordinary baking soda are said to be of value since the poison is rapidly destroyed by these fluids. Artificial respiration may be required. See a physician at once if you are fortunate enough to be near one.

Prevention: The extremely toxic nature of this poison cannot be overemphasized. Most areas where paralytic shellfish poisoning is likely to occur are examined by local public health authorities. When toxic shellfish are discovered, the area is placed under quarantine. One should adhere strictly to local quarantine regulations. Since poisonous shellfish cannot be detected by their appearance, smell, or by discoloration of a silver object or garlic placed in cooking water, etc., it is only by careful scientific laboratory procedures that paralytic shellfish poisoning can be determined with any degree of certainty.

The digestive organs, or dark meat, gills, and in some shellfish species the siphon, contain the greatest concentration of the poison. The musculature or white meat is generally harmless; however, it should be thoroughly washed before cooking. The broth, or bouillon, in which the shellfish is boiled is especially dangerous since the poison is water soluble. The broth should be discarded if there is the slightest doubt. The tidal location from which the shellfish were gathered cannot be used as a criterion for whether the shellfish are safe to eat. Poisonous shellfish may be found in either low or high tidal zones. If in doubt, throw them out!

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The Treasurer-Membership officer should be notified promptly of any change of address.

NEW YORK
SHELL CLUB
INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

__PLEASE NOTE__: There may be differences in dates and/or places for meetings from those given below. Consult your current issue of NYSC NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

1996 - 1997

September 8, 1996
October 13, 1996
November 10, 1996
December 8, 1996
January 12, 1997
February 9, 1997
March 9, 1997
April 13, 1997
May 11, 1997
June 8, 1997

With the exception of this year's November and April meetings, (see NOTE below), meetings are held at the American Museum of NATURAL HISTORY, Central Park West at 79 Street, New York City, starting at 2 PM. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying the Museum's admission fee by presenting your NEW YORK SHELL CLUB membership card.

Please note the change in meeting room for our Fall meetings; the Museum is renovating our usual meeting room this Fall, so they have given us the Blum Classroom, 1st floor near the 77th Street entrance to the Museum. This applies to the September, October and December meetings--the November meeting will be the field trip to the Philadelphia Shell Show. Presumably Room 319 will be available for our 1997 meetings; the December NYSC NOTES will have further information.

NOTE: NEW YORK SHELL CLUB pins are availble; $3.50 at a meeting.

Mail orders should be sent to; ($4.00 by mail)

Theta Lourbacos, NYSC
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NEW YORK SHELL CLUB NOTES No. 340 September, 1996 Page 1

The NEW YORK SHELL CLUB meets on the second Sunday of each month September to June at the American Museum of Natural History, New York City (unless otherwise noted). On meeting days your NYSC membership card will provide admission to the Museum without payment of the Museum's fee.

Please note changes from our usual meeting room and events.

PROGRAM SCHEDULE

SUNDAY, September 8, 1996	2:00 PM	Blum Classroom, 1st floor THE PINK SANDS OF ELEUTHERA Dorothy Jensen, slides & tape
SUNDAY, October 13, 1996	2:00 PM	Blum Classroom, 1st floor Workshop on Managing Your Collection
SUNDAY, November 10, 1996		Field Trip to PHILADELPHIA SHELL SHOW (see Page 2)
SUNDAY, December 8, 1996	2:00 PM	GRUNDGE PARTY (see Page 2) Blum Classroom, 1st floor

NOTE: Blum Classroom is on the 1st floor of the Museum, near the 77th Street entrance, past the big canoe.

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HIGHLIGHTS OF JUNE MEETING

June 9, 1996. President Cowles was the speaker of the day. The subject of Part I of his two-part presentation was rare shells, seen in slide photographs. He led off with a picture of a Murex beaui that is a prize specimen at the National Museum of Natural History. He also showed some shells that he had collected in Mexico, including many limpets.

Part II of Ed's presentation was "Shells in Pre-Columbian Art." He showed slide photos of pectorals, pottery, wall carvings and other artifacts that featured shell designs, and art works in which the theme is shell designs. He also showed photos of textiles dyed with substances derived from mollsks, and a series he took in the impressive Museum of Anthropology in Mexico City.

ELECTION OF 1996-7 OFFICERS AND DIRECTORS

The following slate of officers and directors, the incumbents, was proposed and accepted without additional nominations at the May Shell Club meeting.

President	Edward Cowles
Vice President	Lawrence Potter
Secretary	Milton Werner
Treasurer	Theta Lourbacos
Historian	Nick Katsaras
Directors	Allen Aigen, Al Scarpetti

There being no nominations from the floor, it was voted that the secretary be empowered to cast one vote for the entire slate.

COMING ATTRACTIONS

SHELL-of-the-MONTH - A member will give a brief discussion on a shell family at each regular meeting.

September - Ranillidae - Romuald Czepulkowski

October - Mitridae - Allen Aigen

Sunday, November 10 - We will not have our usual meeting at the American Museum. Instead, our meeting will be a 'road show'! the Philadelphia Shell Show, 1996 Edition. This Show which grows more spectacular every year will run November 8, 9 and 10. The Long Island Shell Club will sponsor a bus ride to the Show on Sunday, November 10. Since this conflicts with our usual meeting date we will forego our regular meeting and let the Show be our "program". It's former location in the Philadelphia Academy of Natural Science will not be available; a new location has not been decided on. The information on the Show and the trip will be announced at our September and October meetings.

Sunday, December 8. We are planning a GRUNDGE PARTY! And what may GRUNDGE be? A portion of seashore sand/sediment/shells from a far away beach, to be explored by members armed with tweezers, magnifiers, etc. at the meeting. Whatever shells are found are yours to add to your collection. We hope to have the grundge from either South Africa or the Philippines.

ANTIPREDATORY BEHAVIOR IN SPONDYLUS

by Henk K. Mienis

reprinted from LEVANTINA No. 80, July 1994

Recently Mienis et al, 1993 described the antipredatory behavior of the Erythraean Spiny oyster Spondylus spinosus (Schreibers, 1793) when attacked by the Mediterranean Banded dye rock shell Hexaplex trunculus (Linnaeus, 1758). When Hexaplex tries to attack a Spiny oyster the latter vigorously flaps its upper valve. It continues flapping until the Muricid predator disappears.

We thought that this antipredatory behavior had not been described before but a search through the literature revealed the brief description of a similar reaction by Spondylus tenellus (Reeve, 1856) when attacked by Tripteratyphis robustus (Verco, 1859) likewise a Muricid species (Clarkson, 1984). When Tripterotyphis starts to drill the spiny oyster, the latter immediately starts to snap with its upper valve.

Since Spondylus tenellus and Tripterotyphis robustus have shared the same habitat in South Australian waters for a long time the Muricid gastropod has learnt that the epibiontic spiny oyster is only able to move its upper valve. Therefore it always drills the Spondylus in the lower valve.

Spondylus spinosus on the other hand is a relatively recent migrant into the Mediterranean Sea. This means that the prey/predator relationship between Spondylus and the autochthonous Hexaplex is brand-new. The latter does not yet know where to attack the Spiny oyster succesdsfully and consequently the Spondylus is rather successful in driving off the attacker.

The antipredatory behavior by Spondylus is comparable to the swimming escape mechanism amongst free living Pecinidae and Limidae (Carter, 1968). The jumping and swimming movements of those bivalves are brought about by the flapping of the valves.

ANEMONES FEEDING ON SMALL CYPRAEA

by D. Korkos

reprinted from LEVANTINA No. 80 July 1994

In June 1994 a Turbo petholatus with a hermit crab inside and covered with live anenomes was taken in shallow water near Devil's Head, 72 Km south of Elat. It was placed in a solution of formalin and later allowed to dry out.

While peeling off the adhering dried anenomes hard lumps were felt. The anenomes were cut open and two small empty cowries were found. They were both about 17 mm. long. One was Cypraea isabella and the other was C. erythraeensis. Cypraea erythraeensis is not often found in this area. It may not be as scarce as previously thought, being frequently overlooked due to its habit of hiding in tiny holes and the effectiveness of its extended mantle as camouflage.

This type of hermit crab is very active and may be seen at night scuttling about the reef, pretty sure of the protection afforded by its load of anenomes. During the day it usually hides under rocks. Both these Cypraea are also usually found under rocks and it is not hard to imagine the anenomes stinging and capturing any gastropod getting too close to it. Epitoniums have been reported to be able to approach an anenome with impunity, but apparently this is not the case with cowries.

LIFE AT A SNAIL'S PACE

by Oscar Schisgell

reprinted from NATIONAL WILDLIFE

Ask the average man what is the most powerful animal in the world and the answers will vary from elephant to lion to mule to ox. Few people will consider the common everyday escargot or land snail -- yet one species, Helix pomatia (the Bourgogne, or Burgundy, of gastronomical fame) easily carries 12 times its own weight, and can pull 200 times the same!

This fragile silver-white creature has other unexpected features. For one, it can exist in the most diverse geographic and climatic conditions- from the depths of the ocean to the tops of high mountains, from African deserts to tropical rain forests. Land snails of one kind or another are found almost everywhere in this country, from the Southwestern desert to the largest cities. They are most common in the East, especially the coastal states from North Carolina to Florida. Few of us, however, are aware of their presence, since they are usually small, always silent, and mostly nocturnal. According to Guy Colwin Robson of the British Museum, there have been over 50,000 species of snails. They can be constructive and destructive, serve admirably as a menu item and in medical research, while producing havoc in vegetable gardens. As a creation of nature they are phenomenal--combining male and female organs within their own body, but traveling distances to find a mate. They provide a unique subject for scientific study.

Two for the gourmet. But speak with a gourmet and the story takes a different turn. The species of snails are immediately reduced to two: the prized Bourgognes and the slightly smaller Petits Gris. These are the two species considered the most succulent by the discriminating palate. Some 250 million of them are swallowed every year in France alone. In time of war an inexpensive substitute for meat and fish, in peacetime the escargot has achieved the status of a delicacy in restaurants which have built their reputation on their special snail recipes, or in homes at Christmas and New Year rèvèillons. Although they are primarily eaten in the shell, there are almost as many ways to season them as there are species in nature. To the gourmet the snail is a gastronomic delight.

Belonging to the natural group of molluscs, without an internal skeleton and practically all muscle, snails originated millions of years ago. Since then they have made their way over most of the world. And this globe-encircling migration is quite an accomplishment, if one considers the proverbial slowness of the "snail's pace". Actually, a Bourgogne on the move can travel as much as 13 or 14 feet per hour, which means that proportionately for its weight, it goes 80 times as fast as the average man!

Despite such feats, the snail does have a predilection for sleep. In addition to six months of bear-like winter hibernation, he crawls into his shell at the slightest indication of hot sun, which dries him out, or heavy rain, which hurts his sensitive tentacles and water-logs him. He can take short naps or spend days huddled in his bedroom behind the thin curtain of mucilage which he draws after himself. And while he sleeps he needs neither food nor drink. Desert snails carry sleeping habits to miraculous proportions. They can stay in an entombed state--dozing off behind a thicker protective filter called the operculum--for as long as three or four years without emerging once.

Beauty in motion. A snail in motion is a thing of remarkably graceful beauty. Its sinuous body--varying in color from gray to white to silver--glides along without visible effort. When it passes through patches of light it seems almost translucent, and at such moments there is a mother-of-pearl quality in its tints.

Students of the snail's movements like to place it on glass so that they can watch its progress from underneath. The snail's underside is a natural suction cup that clings hard to whatever it crosses. Tiny muscles, rolling back in waves, act like the treads of a caterpillar tractor, and thus the fragile body is propelled forward.

Wherever they go, snails lay a protective carpet of glue under themselves, a colorless, sticky discharge that sometimes shimmers silver in the light. To indicate how effective this coating can be, scientists have induced snalis to crawl along the sharp edge of a razor blade. There was never a sign of a cut!

This mucus has another unique purpose: it helps the snail stock up on the raw material which is essential to its house building and mending activity. During the summer months the snail needs to absorb large quantities of lime which is then transformed into the shell and the operculum. (Fresh-caught Burgognes and Petits Grits are not eaten in the summer months, because that is when their bodies are full of the gritty, bitter material.) The mucus has a very high acid-content which attacks limestone and dissolves it, making it possible for the snail to ingest it.

Moisture is life. In the snail's everyday life, moisture is the controlling factor: moisture to keep the body supple, moisture for the silver path, and moisture for nourishing the young green sprouts the snail dotes on. Come mid-April when the temperature turns milder and spring showers bathe the landscape, the snail wakes up and cautiously sticks out its tentacles to survey the scene. The upper pair of antennae, which can elongate themselves to three quarters of an inch or more, are topped by the eyes. The lower two, much shorter, contain extremely sensitive organs of touch.

As the snail proceeds after his first meal, he stretches his entire body, which may be three inches in length and a quarter inch thick, out of the shell. Woefully nearsighted, his strong sense of smell helps him zero in on greens. And then his tiny mouth goes to work. Although no larger than a pinprick, it is equipped with lips, a tongue--and 25,600 infinitesimally small but incredibly effective teeth. Try to keep a snail in a cardboard box or plywood crate, and he will eat his way out to freedom. If he wears down the teeth, he replaces them as easily as he repairs a broken shell.

Sun shy. Early morning and late afternoon hours are best for foraging in the spring. The rest of the time the snail crawls away to hide from the sun's rays. But cloudy and drizzly days become uninterrupted day-long orgies of eating, for the forager has a primitive stomach and can go on gorging for hours. And a good thing it is that it can lay in a good supply, for not only are the winter months lenten, but summer droughts as well.

Twice a year, in spring and fall, the snail suddenly stops eating and takes to wandering restlessly about. It is the time for love. Considering the fact that snails combine male and female organs in one body, snails ought to be able to reproduce their own kind without contact with another snail. Yet, except for a few species, this is not so.

Search for a mate. Consider the familiar Bourgogne's sex life. When it has eaten its fill, it begins to look around for a mate. Those nearby are too familiar to arouse interest. Instead, its antennae reach out, probing here and there.

Suddenly discovering the traces of an unfamiliar silver path, the Bourgogne becomes aware of a strange snail some distance away, and sets out at top speed.

The lov-quest ends when behind a discreet blade of grass the snail meets its chosen made face to face. An elaborate courtship sometimes lasting several hours follows. They first bite each other, then prod with special darts seeking the minute holes on the right side of the neck which are the genital orifices. Having found and explored them, the two hermaphrodites finally unite at the neck and leave each other pregnant. Afterwards they lose interest in their mates.

Twelve to 15 days after mating, the Burgundy picks a sheltered moist spot at the base of a tree or amid grass roots close to a potential food-supply, and there digs a nest--a hole about four inches deep. The digging requires up to 10 hours, the snail using its body as a sort of combination steam shovel and compression drill. Then for over a day the snail carefully drops as many as 60 tiny eggs one by one into the hole. This done, it covers up all traces of the nest and wriggles away for good, abandoning the eggs to their fate.

Miniature snails. Fortunately, nature has made excellent arrangements for them. Within three or four weeks the eggs hatch into perfect miniature snails, equipped with a complete, albeit paper-thin, shell. As soon as they leave the eggs the young snails are fully able to cope with life--crawl out of their nest, provide themselves with food, and find shelter. They even inherit a distrust of the sun--during the first few weeks of their lives they circulate only late at night. Depending on what time of year it is born, the Burgundy reaches full maturity after two or three winters--provided birds, mice, toads, snakes, or carabid beetles don't get at it first.

Every year the snail adds about a tenth of an inch to its shell, depending on climate and diet. In France, where snails are systematically gathered from farms and gardens, two years is the average life-span.

There are, however, giants that have been shipped to France from lands where they were allowed to age much longer. Emile Dhumerelle, one of the best-known snail dealers in Paris, exhibits shells bigger than hens' eggs. He has one as big as a tennis ball. But such monsters are rare. Dealers who find such shells treasure them as museum pieces.

Easy to cook. Big or little, the snail attains his greatest stature at the end of a fork. From the days when housewives had to spend tedious hours washing, boiling, then simmering in spices and preparing sauces for them, escargots have today become one of the quickest and easiest dishes on the French menu. Some 40 large "snail preparers" see to it that housewives can find at their favorite fish market, 'charcuterie', or delicacy store a ready supply of Bourgognes, Petits Gris, or "reconquillés"--Petits Gris stuffed into Bourgognes shells--ready to heat and serve. And in the United States a growing army of escargot devotees annually devours about 700,000 pounds of the tiny creatures, all of them imported from abroad.

Meanwhile, French scientists have found other uses for the snail. Every spring the faculty of Medicine at the University of Paris stocks up several hundred pounds of the molluscs. These are kept alive at a low temperature to be used as needed by a staff of some 100 technicians. According to the heads of the laboratory, the gastric juices the snails secrete have proved invaluable in the study of sex and adrenal hormones, known as steroids, attached to other molecules in the human bloodstream. Thanks to a discovery made in 1952, the chemical properties of this secretion have made it possible to isolate steroids without damaging them. By studying their concentration in blood or urine it is possible we may detect the presence of certain types of cancer.

There's no telling where the snail's silver trail may lead.

Vol. XXVI(5): 1994 THE FESTIVUS Page 57

THE SECRET IS OUT: A NEW MOUSETRAP HAS BEEN INVENTED!

HAL & CHARLOTTE NORRID

233 E. Cairo Drive, Tempe, Arizona 85282

Full disclosure has been made. When they go camping together, the Skoglunds never have mice in their camper and the Norrids always do.

In the spring of 1993, Carol and Paul Skoglund found a live *Spondylus leucacantha* Broderip, 1833 (about 110 mm L) and put it on the doorstep to their camper. During the night the bivalve relaxed and opened its valves. Along came an inquisitive mouse. The *Spondylus* responded by quickly closing its valves and the poor little mouse did not get into the house (Figure 1).

No mice in the Skoglund's camper!

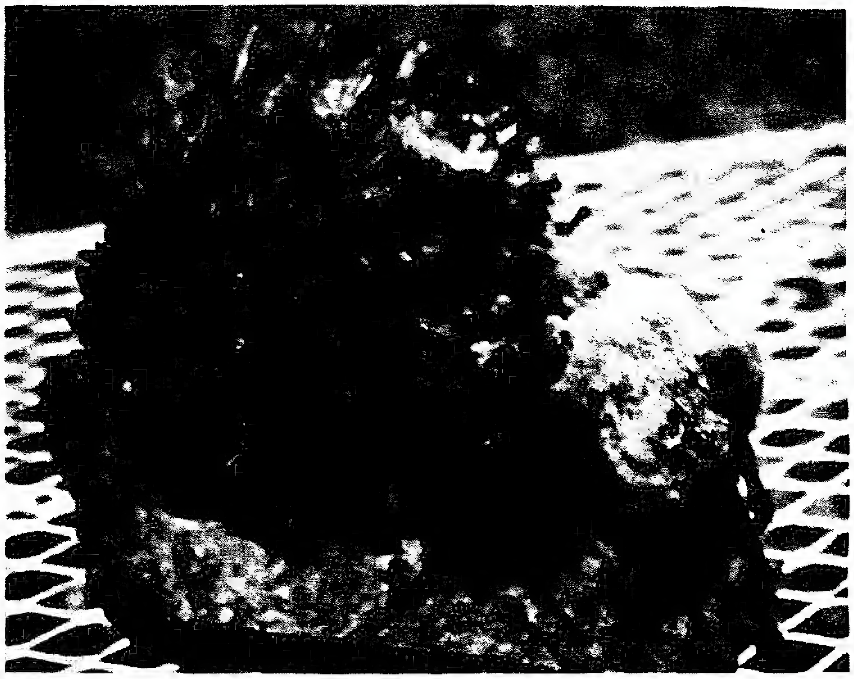

Figure 1. The *Spondylus leucacantha* mousetrap with mouse.

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FOUNDED JAN. 1949

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Foreign Membership $12.00 per year, paid in U.S. currency

The Treasurer-Membership officer should be notified promptly of any change of address.

NEW YORK
SHELL CLUB
INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

PLEASE NOTE: There may be differences in dates and/or places for meetings from those given below. Consult your current issue of NYSC NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

1996 - 1997

September 8, 1996
October 13, 1996
November 10, 1996
December 8, 1996
January 12, 1997
February 9, 1997
March 9, 1997
April 13, 1997
May 11, 1997
June 8, 1997

With the exception of this year's November and April meetings, (see NOTE below), meetings are held at the American Museum of NATURAL HISTORY, Central Park West at 79 Street, New York City, starting at 2 PM. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying the Museum's admission fee by presenting your NEW YORK SHELL CLUB membership card.

Please note the change in meeting room for our Fall meetings; the Museum is renovating our usual meeting room this Fall, so they have given us the Blum Classroom, 1st floor near the 77th Street entrance to the Museum. This applies to the September, October and December meetings--the November meeting will be the field trip to the Philadelphia Shell Show. Presumably Room 319 will be available for our 1997 meetings; the December NYSC NOTES will have further information.

NOTE: NEW YORK SHELL CLUB pins are availble; $3.50 at a meeting.

Mail orders should be sent to; ($4.00 by mail)

Theta Lourbacos, NYSC
66 West 94 St., Apt. 20C
New York, NY 10025

The NEW YORK SHELL CLUB meets on the second Sunday of each month, September to June, at the American Museum of Natural History, New York City (unless otherwise noted). On meeting days your NYSC membership card will provide admission to the Museum without payment of the Museum's fee.

Please note changes from our usual meeting room and events.

PROGRAM SCHEDULE

SUNDAY, December 8, 1996	2:00 PM	Blum Classroom, 1st floor GRUNDGE PARTY * SEE NOTE BELOW
SUNDAY, January 12, 1997	2:00 PM	To be announced Room 319
SUNDAY, February 9, 1997	2:00 PM	SHELLING IN TEXAS, Steve Rosenthal - Room 319
SUNDAY, March 9, 1997	2:00 PM	JENSONIA - Slides & Tape Dorothy Jensen - Room 319
SUNDAY, April 13, 1997	1:00 PM	ANNUAL NEW YORK SHELL CLUB SOCIAL AND AUCTION

GRUNDGE PARTY - No, you will not have to come unwashed, nor will you get dirty; the only music will be ooh's and ah's as you pick out great shells from unsorted masses of beach drift material (grundge) from South Africa, which has unique endemic fauna, only recently becoming known from deep water dredging and scuba activities. All you will need to bring is a pair of tweezers and a hand lens, for the smaller specimens. We provide the dried grundge, paper plates for sorting and plastic bags for goodies. References and expertise will be available to help identify your prizes.

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HIGHLIGHTS OF RECENT MEETINGS

September 8, 1996. The Shell-of-the-Month was Conus gloria-maris, presented by Carl Ehrlich, who displayed several that he had collected off Guadalcanal in the Solomons. This is the locality for most of the specimens being collect4d. Their preferred habitat is a depth of 50 to 100 feet, in the murky water where a river empties into the sea. During the day they like to hide out under sunken dead trees, favoring the root end of the log. While it's necessary to feel for them, there is reassurance in the fact that they are only slightly aggressive and will retreat into their shells when poked and otherwise mistreated. This contrasts with, for example geographus, which will stand its ground and make a determined search for something to harpoon. The mollusk-eating gloria-maris is hardly as rare as once thought, but its highly specific habitats are only one factor in a difficult collecting situation. Carl has collected about a dozen. They are also found in the Philippines, where Carl believes they are collected with tangle nets and by diving.

Allen Aigen drew attention to a display of cymatiums from his collection.

The speaker for the day was the voice of Dorothy Jensen, from an audio tape synchronized with a series of slides illustrating a collecting trip to Eleuthra several years ago. The photos included scenes, shelling areas and shells, and her narration was both lively and enlightening.

October 13, 1996. A letter from Cecelia Abbott, thanking the Club for its expression of condolence on the death of Dr. Abbott, was passed around.

The first of Romuald Czepulkowski's two Shells-of-the-Month was Cepaea nemoralis, which he noted had been introduced here from Europe, as was C. hortensis. Hortensis has since disappeared from the U.S., but still lives in the colder climate of Newfoundland and its neighboring areas.

The speaker was Allen Aigen, whose presentation was based on the similarity in appearance of Mitra, Costellaria and Pleioptygma. He divided the members into two groups and provided each with nine shells representing the three groups, along with a list of questions that could be answered by astute observation of shell characters. For further enlightenment he read from Indo-Pacific Mollusca of September, 1976 and Walter Cernohorsky, Part II, 1991.

Milton Werner reported that in a phone conversation with Dr. William Emerson he had learned that the exhibit that had replaced Mollusks and Mankind (at the American Museum) is temporary, and that the Museum would return the space to the Dept. of Mollusks.

Romuald's second Shell-of-the-Month was Cymatium fittgaui, named after a German naturalist. He noted that this species is not easily distinguished from tenuiliratum, and is therefore considered rare. He said that the type photographs are of little help in making the distinction, but with the shells in hand they can be separated fairly easily.

President Ed Cowles closed the meeting at 4:09 p.m. with the reminder that so many members had signed up for the November 9 bus trip to the Philadelphia Shell Show that this excursion would be considered the November meeting of the Club.

Milton Werner, Secretary

OOH, AAH, AND WOW AT THE PHILADELPHIA SHELL SHOW

Milton Werner

Nine of our members and 22 members of the Long Island Shell Club had a look at the '96 edition of the two-day Philadelphia Shell Show on Day One, November 9, traveling in comfort in a chartered bus as arranged by Mel Springer. (He, like many of the 29, holds "dual citizenship.")

The show, the Philadelphia club's eighth since 1983, and again held in the city's Academy of Natural Sciences, was as spectacular as visitors have come to expect. Al Schilling, chairman of the event, noted that the competitive exhibits totaled 20. They were well mounted, informative and in many cases challenging to one's conchological expertise. The Shell of the Show, shown by Richard Y. Kirk, of Philadelphia, was the larger of a pair of Boreotrophon stuarti.

The dealers had brought their large displays from home bases in Florida, California, Maryland and New York. Their offerings filled a spacious room with the stuff of ooh and aah. Temptation was rampant and business was brisk.

Dr. Gary Rosenberg, curator of the Academy's vast molluscan collection started in 1812, was gracious enough to give the New Yorkers a guided tour of the collection and the work stations. He did this twice, so as to divide us into manageable groups.

Some of us made sure to get into the Academy's special exhibit of live butterflies. In a room that's kept warm and moist, dozens of these tropical eye-poppers, of several species, flit around among their admiring public, dip their proboscises into the juices of pulped fruit, find resting places on the many species of vegetation, and occasionally settled for a second on an outstretched hand. Wow.

NOTES FOR A MINI MITRE WORKSHOP

Allen Aigen

Mitres are a worldwide family in the Volute superfamily. They are primarily from shallow, warm water, but a few are from temperate and from deep water localities. Most are Indo-Pacific. They are found in clean or muddy sand, or are found in or around coral reefs, or under stone or coral rubble. There are about 260 described living species, in 9 genera and 8 subgenera. The group evolved at the time of the late dinosaurs.

Mitres are fusiform, elongate-oval, cylindrical or conical, about ½ inch to 6 inches long. (The name refers to the resemblance of some of them to pointy bishops' hats). They have convex or angulate whorls, a generally narrow aperture, and 3 to 11 close-set folds on the columella, with the first posterior fold (toward the spire) longest. The surface, especially on juvenile forms,is grooved, pitted, ribbed, folded or granulated. There is no operculum and no lirae inside the outer lip. There is a distinctly notched siphonal canal. The protoconch is conoidal and multispiral. There may be a periostracum. A black periostracum on a white shell is not uncommon.

The radular characteristics are distinct and are used to distinguish mitres from similar families as well as to sort out similar genera within the family.

The animal has a moderately long foot (for rock or sand), square in front and round to elongate in the rear. The eyes are simple, unicolored or ringed, and are at the broad base of pointed tentacles.

Similar families include the Costellaridae (Vexillum and others) which are often found with mitres. The Volutomitres are small, colder water shells, generally oval. Their second posterior fold is longest. Pleioptig matidae, a nearly extinct family of only one known species in the Caribean, was recently set apart due to the animal's characteristics. Common in the Florida Miocene and Plio-Pleistocene, young ones are nearly identical to mitres.

The best reference for the mitres is by Walter Cernhorsky. Part I is in "Indo Pacific Mollusca" Vol.3, No. 17 from 1976. The second half is in "Monographs of Marine Mollusca" No. 4, 1991.

Mitres are carnivorous. Some are known to specialize in worms. There may be nothing in print on the feeding habits of most of them.

Mitres are eaten whole by bursids and cymatids, and drilled by muricids and natricids. Many adult forms are very thick, therefore, for self-defense. Young shells use corrugations to strengthen the shell. Mitre (M) papalis was sharpened and used as a chisel in the South Pacific as its shell is so thick and strong. They also protect themselves from crabs. The thickened shell and lip deters spire and lip breakage, and the apertural folds help make them hard to grab and pull out of the shell (especially since there is no operculum).

The shell shape is a good clue to the environment where they live. Most species are elongate sand dwellers, fewer are fat shells which can get around in crevices and under rocks.

Eggs are laid in little (2 mm.) elongate capsules, in bunches of 15 to 100, attached to rocks or weeds. Each capsule contains 100 to 500 eggs. Mitres have free-swimming veligers, corresponding to their multispiral protoconch and often widespread distribution.

Shells within a species can vary from fairly equal to fairly elongate, and from fairly rough to fairly smooth. Subspecies names are sometimes used for these forms. Since there are names available for most common varieties nomenclature is messy.

Mitres are not popular like cones and cowries. There are relatively few species easily available for nominal prices. Many go for $5 to $15, a few $50 to $60.

NOTE: The workshop consisted of 3 sets of shells (9 species) which were xeroxed with their labels, and put in 3 plastic bags. Accompanying them was a set of questions designed to get people to look closely at the shells and to think about them - as well as discuss them in a small group. These were handed out first, with the lecture/discussion following to clarify the answers. Other mitres were passed around to further illustrate the diversity in the Family.

NOTE

If anyone is interested in doing a short presentation like this, on a family, genus, ecological group, whatever!, please let one of the officers know, and we will gladly schedule you. Note, you don't need a great collection. I don't have many mitres, and most are common types with poor data. Therefore, I don't mind letting people handle them.

And please bring in your specimens for bragging, or for identification, when we have these mini workshops.

THE SHELL GAME

by David K. Bulloch

Reprinted from UNDERWATER NATURALIST, Bull. of the American Littoral Society, Vol. 20, #2, p. 7

Unlike other knights of the order Decapoda (prawns, shrimp, crabs, and lobsters), the hermit crabs do not come equipped with full suits of armor. They lack any hard parts aft of their cephalothorax, which leaves their soft and defenseless hindquarters exposed to easy assault.

Their evolutionary response to nature which provided only plated gloves and jackets but no pants has been to employ empty snail shells as leggings. Among a few species in odd parts of the world, other items have been pressed into service--bamboo joints, half a coconut shell, and even a concavity in a bryozoan colony--but most stick to gastropod attire.

Their evolutionary response to nature which provided only plated gloves and jackets but no pants has been to employ empty snail shells as leggings. Among a few species in odd parts of the world, other items have been pressed into service--bamboo joints, half a coconut shell, and even a concavity in a bryozoan colony--but most stick to gastropod attire.

Since hermits of various species come in different size ranges, each must habituate the haunts of a similarly sized snail host to find a custom fit. In the shallow waters of mid-Atlantic shores, Pagurus longicarpus (the long-clawed hermit), the commonest of the snail tideline hermits, inhabits the shells of the periwinkle, Littorina littorea; the mud snail, Alectrion trivittata; and the little moon snail, Natica pusilla.

A larger cousin, P. pollicaris (the flat-clawed hermit), abundant in deeper waters from Maine to Florida, suit themselves in the carbonate remains of the whelks, Busycon; the sandcollar snail, Natica; and moon snails, Polinices, or any other large shell it can find.

On the west coast, the tidepool hermits, P. samuelis and P. granosimanus, have an overwhelming fondness for Tegula shells; whereas P. hirsutiusculus, more plentiful in deeper water, prefer Acanthina or Olivella.

Ten or more common species of hermits in the tropics use the wide variety of shells found in warmer waters. The tropics sre also home to a land hermit, the soldier crab, Coenobita clypeatus, that leaves the sea when just out of the larval stage, returns often when young, but wanders further afield as an adult, returning only to procreate. The adult has a fondness for the West Indian top snail, Cittarium pica, and is the reason these shells are often found deep in the rainforest and at relatively high altitudes.

Hermits often share both the inside and the outside of their chosen mobile home with others. The slipper shell, Crepidula, finds the interior lip of a whelk a good place to live, and its presence doesn't seem to bother a hermit one bit. Deep inside, the polynoid worm, Halosydna, or a polychaete, Neries, may set up housekeeping practically in the bosom of the hermit. Whether these worms arrive before or during occupancy by the hermit is unclear.

The outside of the shell can be cluttered with a long list of life--anything from the lightweight fuzz of Hydractinia or a coat of bryozoa, to a substantial load of barnacles or anemone that add serious weight to the total load the hermit must haul.

Irrespective of the burden, having an anemone on one's shell is something of a status symbol in the hermit's world. A have-not, especially if it is bigger, will boldly approach a have, grab the anemone around its midriff with its large claw, and give it a squeeze, at which point the anemone will let go its hold on its former home and, upon positioning, attach itself to the shell of its new companion.

Even fully shelled the hermit has enemies. The octopus, for one, and sheepshead, spotted kelpfish, and perch for others. In England, the lemon dab will watch a hermit crab that has inadvertently been turned over. To right itself, it must stretch its body a long way over the lip of the shell, exposing itself enough for the dab to make a fatal pounce. Does the lemon dab deliberately knock the hermit off its feet in the first place? Only patient observation will tell.

Sex has its dangerous moments as well. Somehow the females growing receptiveness is sensed by the male which will seize her shell and carry it (and her) with him occasionally banging their two shells together. When both have reached the necessary level of stimulation they simultaneously pop out of their shells, mate in a flash, and pop back into their respective quarters.

Aside from the daily grind of searching for food and occasional sexual forays, the hermit finds house hunting a consuming preoccupation. Although there have been a few reports to the contrary, most species have the common decency to wait until the original occupant passes on its legacy via natural causes. This is probably due more to the impervious defense the snail can muster by withdrawing its foot and blocking an attack than any altruism on the part of the hermit.

Presented with a cluster of empty shells, the hermit ritually repeats an elaborate inspection of each one, turning the shell over and over, probing its passages, and if eminently suitable, popping out of its old home into its new. Even a new shell home does not stop it from going through the same routine with every encounter. If it comes across a shell it has recently examined, the normal rigamarole will be duly abbreviated as it somehow senses it is going over ancient history.

If a new shell is already occupied by a hermit, neither is deterred from the shell game. If the bigger of the two decides it wants to try out the shell of its smaller acquaintance, it is sure to get its way. The vanquished, forced to withdraw from the shell, is not molested by the victor and will usually pop into the victor's hand-me-down or, if that's not possible, quickly burrow into the sand to get out of harm's way before some other predator comes along to take a snap at its hindquarters.

The hermit's house hunting is entirely innate, unlearned, and hardwired into its genotype. That is not to say the hermit is incapable of adaptive behavior. It is, but the presence of an empty shell automatically sets off a foreordained response that is present from the very first time it sets eyes on a shell.

The ethologist, Konrad Lorenz, calls this behavior a "species-characteristic drive-action" (the term in German "arteigene triebhandlung" doesn't translate into anything more succinct). It is a set of neurophysiological sequences in which a selective response to a specific stimulus releases a fixed motor pattern. Put another way, a pattern of movements is evoked by an impulse internally produced but held in check until externally released by what has come to be called an "innate releasing mechanism" (IRM).

This pattern of movement and its trigger, the IRM, is similar from one species of hermit to another, indeed from one genus to another within the suborder Paguridea, with as much constancy as their common physical characteristics.

These motor sequences have a phylogenetic origin and are part and parcel of the hermit's inheritance. As such, hermits are highly resistant to individual modification. However, all animals have a feedback circuit that interprets the consequencies of their behavior; specifically whether it is useful or not under prevailing circumstances. If you were to partly fill some shells with plaster of Paris or, more challenging, lightweight plastic foam, the hermit will learn by examination that the shells are useless.

Because they are ceaselessly active, hermits make good aquarium additions. They are easy to maintain. Feed them brine shrimp and, occasionaly, a bit of seaweed. Forget hunks of meat that might entice other crabs. Hermits eat only small fragments and will not tear big pieces apart.

If, by chance, you want to entice a hermit crab out of its shell to temporarily get a better look at it, give up all thought of pulling it out. It will hold fast with two claw-like uropods affixed to its hindquarters and you will only break it in two.

The best way to get a hermit out of its shell is to tempt it with a new shell with a hole drilled in an appropriate rear whorl. When the hermit takes up residence in the shell with the back door open, you have only to prod into the hole with something pointed to elicit its departure. In fact, one marine biologist so acclimated a pet Pagurus that it immediately dropped out of its shell without a poke whenever it was lifted out of the water. Put back in the aquarium, it would await the return of its shell, and instantly resume residence when the shell was dropped back into the water.

GROWING RED TIDE IMPERILS SHELLFISHING ALONG TEXAS GULF COAST

from The New York Times, Sunday, October 13, 1996

SEADRIFT, Tex. Oct. 11 -- An outbreak of red tide that has already killed more than 1.5 million fish and that scientists thought was dissipating last week, is instead expanding and threatening the fishing and tourism industries along two-thirds of the Texas Gulf Coast.

In disclosing the red-tide expansion this week, state health officials extended a harvesting ban on shellfish to include all bays from Galveston Island south to the Mexican border at Brownsville, which covers nearly 300 miles of coast.

State health officials predicted that the oyster season, scheduled to open Nov. 1, would also be canceled, though no announcement of that has been made. ..."This may be the one that finally just runs us right out of the business," said Jerry Amason ..."If it's not floods, it's hurricanes. If it's not droughts, it's oil spills. If it's not oil spills, it's the damned red tide."

Red tides result from a growth spurt, or bloom, of single-cell algae that add a reddish tint to seawater and bear a neurotoxin that paralyzes a fish's ability to breathe. Oysters and other filter-feeding mollusks collect the toxins in concentrations that can be harmful to humans, state officials said, and that was why the ban on shellfish was imposed. There is no ban yet on shrimp of fin fish, state officials said.

Red tides, described as "wildly unpredictable" events by research scientists, usually last from 1 to 18 months. A red tide along this coast in 1986 continued for 4 months and killed an estimated 22 million fish.

• • • • • • •

Airborne particles of the tide can cause eye irritation or difficulty in breathing for people with respiratory problems.

• • • • • • •

RECENT E-MAIL EXCHANGE - HAWAIIAN SHELL NEWS

Thomas A. Burch, MD, Editor
Hawaiian Shell News
P.O. Box 309, Kailua, Hawaii 96734, USA

\>Dear Dr. Burch,
>
>I have been a member of the Hawaiian Malacological Society since 1982 and
\>was horrified at your recent decision to cease publication. I know that
\>all of the clubs are in trouble, but for the flagship publication to go
\>under is a real blow to the field. As Vice-President of the New York Shell
\>Club, and a member for 33 years, I have seen our own club's membership
\>decline precipitously (especially since the founding of the Long Island
\>Shell Club), and our own New York Shell Club Notes go to quarterly from
\>monthly publication.Our membership is I believe in the 200 range, and
\>meeting attendance (which was 50-75 in the old days) is miniscule --
>10 to 15 is quite normal (and pathetic, for New York City). All the work
\>of the club is essentially done by half a dozen people. We also faced the
\>issue of ceasing to publish -- and may have to if things get any worse --
\>but for the time being are holding on.
>
\>Times are clearly bad for our two clubs, and probably others. Part of
\>this has to do with a rapidly aging membership and our inability to
\>replenish it. I hope the COA gives some attention to this before things
\>get worse. I for one would be willing to pay more to HMS in dues, which
\>have held steady for the past 4 years, although I don't know about
\>others.The bulk mail service is another matter, since you have such a wide
\>membership -- our members are predominatly local.

>
>I for one will continue to check out your Web Page on the Internet, but am
>afraid plenty of people will not. If at all possible, I would suggest
>occasional hard copy updates of club activities, perhaps on annual basis
>-- anything to keep people together and remind them they are still a
>club. And if there is any chance of reconsidering your decision, we in New
>York would be delighted if you would do so.
>
>Thanks for a great publication and service to the field in the past, and I
>hope your decision marks a new phase rather than the end of the party.
>
>With Best Wishes,
>
>Larry Potter
>Vice-President
>New York Shell Club

From hsn@hits.net Sun Oct 27 13:57:46 1996
Date: Sun, 27 Oct 1996 08:15:30 -1000
From: Hawaiian Malacological Society <hsn@hits.net>
To: Lawrence Potter <lgp5@columbia.edu>
Subject: Re: HSN cancellation

Dear Mr. Potter:

Thank you for your very kind letter. We will be sending an "HMS Bulletin" to every member which will have the program for the next meeting, some club news, and hopefully a very short article with a picture. One of our greatest problems--and one you mentioned--is the paucity of volunteers. The greatest problem, however, is money, and this declines whenever we raise the dues! For the past several years it has cost more to publish the HSN than our income and so we have been using our capital. We were afraid that, if we raised the dues enough to cover the cost of publishing, the membership would drop so that the amount that we collected would be inadequate.

I also hope that we can resume publishing the HSN but I'm part of the problem in that I no longer want to be editor and the only person who would consider being editor lives on one of the other islands and, if editor, would only put out four issues per year. Also, he would have to releigh on a "friend" for computer work other than simple word processing.

So, if we can get a new editor and enough money, we will resume publishing the HSN.

Aloha, Tom Burch

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These NOTES are issued four times annually and distributed by mail to all members of NEW YORK SHELL CLUB. Items and articles for publication in the NOTES should be sent to the Editor. A limited number of back issues of the NOTES are available, $2.00 per copy postpaid.

Dues for all members are due and payable for the following year beginning each September.

Full Membership $12.00 per year
Full Family Membership $15.00 per year
Corresponding Membership $10.00 per year
Foreign Membership $12.00 per year, paid in U.S. currency

The Treasurer-Membership officer should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

PLEASE NOTE: There may be differences in dates and/or places for meetings from those given below. Consult your current issue of NYSC NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

1996 - 1997

September 8, 1996
October 13, 1996
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December 8, 1996
January 12, 1997
February 9, 1997
March 9, 1997
April 13, 1997
May 11, 1997
June 8, 1997

With the exception of this year's November and April meetings, (see NOTE below), meetings are held at the American Museum of NATURAL HISTORY, Central Park West at 79 Street, New York City, starting at 2 PM. Visitors are always welcome.

On our meeting days, you may gain admission to the Museum without paying the Museum's admission fee by presenting your NEW YORK SHELL CLUB membership card.

Please note the change in meeting room for our Fall meetings; the Museum is renovating our usual meeting room this Fall, so they have given us the Blum Classroom, 1st floor near the 77th Street entrance to the Museum. This applies to the September, October and December meetings--the November meeting will be the field trip to the Philadelphia Shell Show.

NOTE: NEW YORK SHELL CLUB pins are availble; $3.50 at a meeting.

Mail orders should be sent to; ($4.00 by mail)

Theta Lourbacos, NYSC
66 West 94 St., Apt. 20C
New York, NY 10025

THE NEW YORK SHELL CLUB meets on the second Sunday of each month, from October to June, at the American Museum of Natural History, New York City (unless otherwise noted). On meeting days your NYSC membership card will provide admission to the Museum without payment of the Museum's admission fee.

Please note that all Spring meetings will be in the Blum Classroom.

PROGRAM SCHEDULE

SUNDAY, March 9, 1997	2:00 PM	JENSONIA - Slides & Tape Dorothy Jensen
SUNDAY, April 13, 1997	1:00 PM	ANNUAL NEW YORK SHELL CLUB SOCIAL AND AUCTION -- details with auction list and location will be mailed about the beginning of April
SUNDAY, May 11, 1997	2:00 PM	Dr. Paula Mikkelsen, AMNH Asst. Curator of Mollusks RECENT COLLECTIONS: Behind the scenes in the Museum collection
SUNDAY, June 8, 1997	2:00 PM	SHELLING IN ELEUTHRA Steve Rosenthal ANNUAL MEETING: Election of 1997-8 Officers and Directors

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HIGHLIGHTS OF RECENT MEETINGS

January 12, 1997. Romuald Czepulkowski asked if the Club had written to Dr. Mansfield and Celia Fuldner's daughter, Mrs. Virginia Stewart, to thank her for the portion of her father's shell collection that she gave to us. (NOTE: The Fuldners joined New York Shell Club in 1961 and remained active members for many years. Celia Fuldner passed away in 1988 and Dr. Fuldner in May, 1995.)

David Epstein said that he was disturbed that some bidders at the auctions have to forgo items they really want because of big-budget bidders who drive prices up. It was noted that this is the essence of auctioning, and that the sale table offers help in this respect.

The program was a colloquy on "How We Maintain Our Shell Collections", moderated by Romuald. The far-ranging discussion included methods of collecting, transporting, cleaning and storing shells, and early and present-day collections and collectors. Suggested way of land collecting included sweeping a net through shrubbery and trapping - placing moistened plywood or cardboard sheets on the ground overnight. Offshore, an old tire left on the bottom for a day or two can work. Romuald noted that the first known collecting expedition was ordered by the Roman emperor, Caligula. He also mentioned Hugh Cuming and his specially built ship "Discovery" and the six Sowerbys. The long and animated discussion naturally harked back one month to the "grunge" meeting," at which we did some South African collecting without the inconvenience of having to go there.

The door prizes were Cymatium echo, won by Nick Katsaras; Crucibulum scutellum, won by Ed, and Strombus labiatus, won by David Epstein

February 9, 1997. Dr. Paula Mikkelsen, who had recently joined the Museum staff to fill the place that opened at the retirement of Dr. William Emerson, attended the meeting and became acquainted with the members present. Paula is Assistant Curator of Molluscs.

The door prizes were Haliotis asinna, won by Nick Katsaras; Latirus castaneus, won by Carl Ehrlich; and Struthiolaria (?), won by Brenda Weiss.

The first part of the day's program was a continuation of the colloquy on "How We Maintain Our Collections," led by Romuald Czepulkowski.

The second presentation was a description, with slides, by Steve Rosenthal of his collecting trip to the Texas gulf coast in December 1986 and January '87. The habitats he explored ranged from a rock jetty to the mud of a marsh near Padre Island. He digressed a bit to do some bird watching at Rockport and to join a boat trip to the Santa Anna National Wildlife Refuge, to observe a moment in the migration of whooping cranes. He noted that the gulf beaches, at that time anyway, were open to everyone. He also suggested that before heading out for the habitats in an unfamiliar area, it is worthwhile to seek guidance from a collector who knows the territory.

His photos included scenes, shells and birds. Despite seeing oil rigs everywhere, he saw no pollution and concluded that there had been little, if any, effect on molluscan life.

Steve also described a trip to Grand Isle State Park near New Orleans in 1995, where he found shells in profusion. A trip to Surfside Beach at Brazeria, Texas in December '96 yielded enough Dosinia discus that he had brought enough for everyone present to take a souvenir.

Ed was about to close the meeting when two visitors, a man and his young son, came forward. The man asked if we would like to hear a few notes on some shell-horns and got unanimous attention. He introduced himself as Steve Turre (rhymes with hooray), a professional trombonist, and unwrapped a Strombus gigas, a Charonia tritonis, a Bursa bufo and a Fasciolaria trapezium. He had cut off their spire-tops in the familiar Caribbean and South Pacific Style. The sounds he produced, however, were not the also-familiar listen-up blasts, but melodies. While pursuing his more conventional career in a band that has made TV appearances, he plays gigs with a shell-playing group that he assembled, in which the shells get back-up from some brass and strings. Steve gave the Club a CD featuring this group's work, which will be heard at a future meeting.

Milton Werner, Secretary

COMING ATTRACTIONS

Sunday, April 13, 1997. NEW YORK SHELL CLUB ANNUAL SOCIAL & AUCTION

This will be held at Dorothy Jensen's Broadway Dance Studio, 31-08 Broadway, Astoria, Queens. We welcome all donations of specimen shells, shell books, and shell-related items, to further enhance the interesting selections we have already. Your attendance and conations are most appreciated because funds from the auction cover the cost of our routine operations and printing our quarterly NYSC NOTES. Also, we need help in providing refreshments and help before and during the auction. Arrangements will be discussed at the March meeting. As in past years, a list of auction items will be mailed to local members and friends at the beginning of April.

Tuesday, April 29, 1997. Professor Geerat Vermeij, At the American Museum of Natural History; 7:00-8:30 PM; KEEPING HOUSES IN A CHANGING WORLD: SHELLS, MUSEUMS, and ECONOMICS; $10¢ $9 for Members; Program Code: ED97209L

Professor Vermeij, University of California at Davis, is the author of "A Natural History of Shells", published in 1993, a review of which appeared in NYSC NOTES, #333, December, 1994, written by Allen Aigen. Copies of Professor Vermeij's recently published book, "Privileged Hands: A Scientific Life" will be available for purchase and signing after the lecture.

1997 SPRING SHELL SHOWS

Apr. 20 Pacific Shell Club Show, San Pedro, CA
Frank Jewett, 1739 Vallecito Dr. San Pedro, CA 90732

May 3,4	VII BELGIUM INTERNATIONAL SHELL SHOW Aarschot, Belgium R. De Roover, Vorsterslaan 7 2180 Ekeren-Donk, Belgium
June 14-15	XVIéme SALON INTERNATIONAL DU COQUILLAGE Lutry, Switzerland Dr. Ted W. Baer CH-1602 La Croix, Switzerland
June 22-26	JOINT ANNUAL MEETING OF THE AMERICAN MALACOLOGICAL UNION & THE WESTERN SOCIETY OF MALACOLOGISTS Santa Barbara, CA Hank Chaney; Santa Barbara Museum of Natural History 1559 Puesta del Sol Road Santa Barbara, CA 93105

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ARMED BUT NOT DANGEROUS

By Doug Stewart

reprinted from NATIONAL WILDLIFE, February/March, 1997

Frequently, we humans look down on invertebrates as inferior forms of life. But at least one invertebrate, the octopus, may possess enough brainpower to alter this biological prejudice.

Octopuses are mollusks, like snails, clams and oysters, but they are smarter, nimbler, more curious and more resourceful than any oyster. They have to be; like their fellow cephalopods, squid and cuttlefish, they lost their external shells millions of years ago, but what they lack in armor, experts say, they make up for in brains. The central nervous system of the octopus is among the largest and most complete in the invertebrate world, rivaling that of many vertebrates, including birds and fish. How intelligent that nervous system makes the octopus is still a matter of scientific debate, however.

Over the years, scientists have tested octopus intelligence by teaching captive specimens to slither through simple mazes and to tell squares from crosses. Octopuses even learn to unscrew lids to get at food.

The most dramatic evidence for octopus intelligence came in 1992. A pair of researchers in Naples, Italy, Graziano Fiorito and Pietro Scotto, used conventional means--food as a carrot, mild electric shock as the stick--to train a group of captive common octopuses to grab a red ball instead of a white one. The Scientists then let untrained animals watch from adjoining tanks as their experienced confreres reached for red balls over and over. Thereafter, Fiorito and Scotto reported, most of the watchers, when offered a choice, pounced on red balls. In fact, they learned to do so more quickly than had the original group. The octopuses, according to the researchers, were original group. The octopuses, according to the researchers, were doing something invertebrates had never been known to do before: learning by watching.

Or so it seemed. Critics since then have weighed in with a list of complaints about the experiment. Controls were sloppy; Fiorito and Scotto themselves concede that untrained octopuses at the outset already preferred red balls by more than three to one. Gerald Biederman of the University of Toronto's Learning Laboratory wrote that octopuses typically "are reluctant to attack novel stimuli." Having watched trained octopuses repeatedly snatch the red ball, the untrained animals may simply have gotten used to watching that ball and so were more apt to pounce on it themselves.

What perplexed scientists most about Fiorito and Scotto's paper, however, was the assumption that the animals would do something in captivity that they would never do in nature. An ability to learn by watching makes sense, in evolutionary terms, only for animals that live in social groups. But octopuses do not.

Indeed, an octopus leads a remarkably solitary life. It never knows its parents. In most species, the mother stops eating while brooding her eggs and dies almost as soon as they hatch. Newborn common octopuses, flealike creatures the size of rice grains, spend their first weeks as ocean plankton, drifting at the surface. After gaining weight, they drop to the bottom, where they spend most of their lives hiding watchfully in dens, which can be rocky crevices, abandoned shells, holes scooped in the sand, even the odd oil drum or mayonnaise jar.

From 150 to 200 species of octopus inhabit the world's oceans. The common octopus, the species best known to scientists, thrives in warm rocky shallows off the coasts of the southeastern United States, western Central America and Japan, as well as in the Mediterranean and the Caribbean. It can weigh up to 50 pounds and have a 10-foot arm span. The species that comes closest in size to the monsters of science fiction is the giant Pacific octopus, found off the western coast of North America and across the northern Pacific to Japan. The biggest ever captured weighed more than 600 pounds and measured 31 feet from arm tip to arm tip. Despite their impressive growth, Pacific giants rarely live longer than three years. At the other extreme, adults of some pygmy species weigh less than a penny, grow to an arm span of less than 2 inches and are lucky to live six months.

"Out of the water, an octopus feels very loose and slimy," says Roland Anderson, a biologist at the Seattle Aquarium. "It's almost like holding a jellyfish. Underwater, though, their arms feel quite muscular, and they're very, very strong." At the aquarium one night, he reports, a 40-pound octopus smashed the sealed, quarter-inch-thick Plexiglas lid of its tank and crawled out. "A night biologist came in and found it slithering around on the floor," he says.

Octopus literature is filled with tales of naturalists briefly leaving animals in open tanks and returning to find them scaling a bookcase, hiding in a teapot or expired on the carpet. Astonishingly compressible, an octopus can ooze through an opening no bigger than one of its eyeballs. Its yen to get loose is probably linked to an instinctive urge to change dens every week or two. But on dry land, an octopus is doomed; within half an hour, it will die from lack of oxygen.

An octopus in the open sea might seem easy pickings for predators such as moray eels, sea lions and bigger octopuses, but the octopus can marshal a dazzling array of defenses. Like a squid, it can disorient a pursuer with a burst of purplish-black ink. Should it lose an arm to the jaws of a predator, it can grow a new limb. More impressive still, an octopus can change color in less than a second.

"When it comes to camouflage, it's the most capable organism on the planet without question," says Roger Hanlon, a cephalopod-behavior expert at the Marine Biological Laboratory in Woods Hole, Massachusetts. "Chameleons are just dead-boring compared to octopuses." The octopus' secret is cells in its skin called chromatophores, which are under muscular control: different pigments come into view as the cell walls are stretched or squeezed.

Octopuses are predators as well as prey, and their camouflage helps them ambush their favorite meals; crabs, snails, shrimp and other small mollusks and crustaceans. In its den, an octopus will often simply lie hidden, its arms coiled, before unrolling one to snag a passerby with the suckers at the tip. While swimming, its preferred attack posture is to parachute gently down with all eight arms outstretched and envelop its prey in the web connecting the arms. Having wrapped up its victim, an octopus holds it against its underside and bites it with a retractable parrotlike beak. Octopusses also crawl over reefs, probing with their arms for hidden prey.

The salivary glands of all octopuses secrete a chemical that helps disable its prey and breakdown its muscle tissue. In at least one species, Australia's blue-ringed octopus, the secretion contains a neurotoxin that constitutes the deadliest venom known in nature, capable of killing an adult human in minutes. However, these octopuses do not bite humans unless handled or disturbed. The poison is used as a coup de grace on the blue-ring's prey, allowing the octopus to eat at its leiaure.

Octopuses as a group act like leisurely, almost lazy animals. The reason is chemical; octopus blood is a poor carrier of oxygen. As a result, an octopus tires easily. To stay alive, it relies on a system involving three hearts and permanently high blood pressure.

This helps explain why even sex is a sluggish activity in many octopus species. With little or no foreplay, without even raising its pulse, a male will extend a specialized arm and insert it into the female's mantle cavity. A sperm packet then slides slowly down a narrow groove in the arm and enters the female's oviduct.

"Yes, it can be pretty blase," says John Forsythe, a research scientist at the National Resource Center for Cephalopods in Galveston, Texas. "Sometimes the female will continue foraging."

Although the scientists have learned a great deal about octopus biology, no one yet knows what and how these animals think. Roger Hanlon of the Woods Hole marine lab points out that explanations other than higher intelligence can account for much of the size of an octopus brain. To camouflage itself, for instance, the octopus must gauge its surroundings and transform its body shape, pattern, color, texture, and brightness in a fraction of a second. "It takes a lot of brain tissue to coordinate all that," says Hanlon.

Then there are all those suckers, which not only grip things but taste them. Each sucker may have 10,000 neurons to handle both taste and touch, and an octopus has thousands of suckers. "You've got to have a big brain to handle all that, too." And the animal needs brainpower to coordinate the movements of its eight long arms. "That's not trivial," says Hanlon. "They use their arms to walk, crawl, burrow, dig, swim, eat, mate--those arms do everything."

Jean Geary Boal is a researcher at the cephalopod center in Galveston who spent a year at Graziano Fiorito's lab in Naples. Having reviewed in depth the evidence for learning in octopuses, she sides with the skeptics. "Hard and fast data about intelligence of octopuses are not very good," she says. Still, she understands what drives people to establish a sense of kinship with these creatures. "It's extremely easy to anthropomorphize octopuses. They make eye contact with you. They reach toward you. There's just something mesmerizing for people about octopuses."

(In researching this article, Massachusetts writer Doug Stewart learned that "octopi" is not the plural that most scientists prefer.)

IS BIGGER BETTER? THE FOSSILS SPEAK UP

reprinted from SCIENCE NEWS, VOL. 151 - February 1, 1997

All living organisms, from fungi to fig trees to flounders, tend to develop larger bodies over geologic time, according to a venerable theory of evolutionary biology. This rule, derived by Edward Drinker Cope in 1871, appears to make biological sense because beefy bodies can better defend themselves against predators and have an advantage in the struggle for food and territory. A new study of mollusk evolution, however, threatens to erase Cope's rule from the textbooks.

Paleontologists can point to many examples of animals that seem to follow the rule, but nobody had ever tried to assess the idea using statistically rigorous methods until David Jablonski of the University of Chicago took it upon himself to size up the issue, a task that took 10 years. As a test, he analyzed the fossils of clams and snails that lived along the Atlantic and Gulf Coasts of North America from 81 to to 65 million years ago. Jablonski measured the sizes of the largest known fossil specimens belonging to 1,086 species. Then he grouped the data into 191 separate mollusk lineages and tracked how the sizes changed over time.

According to Cope's rule, both large and small species in each lineage should have gotten bigger with time. Jablonski found no such pattern in his data. While 27 to 36 percent of the mollusk lineages consistently developed bigger bodies, 26 to 27 percent evolved smaller body sizes. Another substantial portion of lineages, 25 to 28 percent, moved toward wider variation, with smaller species getting smaller and larger species getting larger. Jablonski reports his findings in the Jan. 16 NATURE. The moral, says Jablonski, is that "large size is not universally advantageous."

In the same issue, Stephen Jay Gould of Harvard University comments that Jablonski constructed "the most comprehensive set of data ever assembled to test Cope's rule--and the rule fails in this case." --R.M.

HOME REMEDIES

by Mary Saul in her book SHELLS

Certain cure for dysentery (advice given to Romans over 2000 years ago)- Take five African slugs - Roast, pound and mix with half a drachm of acacia and some myrtle wine.

To cure a cough and also a stomach-ache, a medicine of snails was recommended--but they must be taken in uneven numbers.

For headaches, a poultice made from slugs with their heads cut off should be applied to the forehead.

Toothache - the small grains of sand found in the horns of the snails would, if put into the hole, remove the pain instantly.

A piece of octopus beaten soft and applied to a wound would stop bleeding, and fine ashes from calcined "bone" of the cuttlefish were effective when extracting pointed weapons which had pierced the skin.

In Europe and America, raw oysters have been prescribed for anemia. In England, a fever (an aque), hang a live snail in a little bag around your neck for nine days and then throw it in the fire. You will see it shake with your fever which it has taken from you.

2 BIOLOGISTS HELP RETURN AN OYSTER TO THE COAST

reprinted from THE NEW YORK TIMES, SUNDAY, Feb. 2, 1997

NEWPORT, Ore. Feb. 1 (AP) - They once grew by the millions in the estuaries along the West Coast from Alaska to Central California; succulent native oysters that scientists later named Ostrea lurida.

But by the late 1890's after years of overharvesting and pollution, the oysters were on the brink of extinction.

Now, nearly a century later, the oysters are making a comeback, thanks largely to the dedication of two biologists here.

The tasty shellfish, much smaller than the imported Pacific oysters raised by commercial growers on the West Coast, were a main food for American Indians, who harvested them at low tide. Early white settlers also relished the little oysters and turned them into a cash crop well before the end of the 19th century.

They imported Chesapeake Bay oyster tongs that could be used to pluck oysters--called Yaquinas in Oregon and Olympics in Washington--from water 20-feet to 30-feet deep. Schooners loaded with the oysters sailed regularly from the ports of the Pacific Northwest to San Francisco, where buyers waited at the docks.

The most populous area on Newport's Yaquina Bay in those days was Oysterville, named for the resource that was the mainstay of the economy. Ledgers from the old oystermen's association indicate that the group's members harvested 200,000 pounds of native oysters in 1895.

But before the turn of the century, the oysters were nearly gone, depleted by overharvesting and the harvesters' practice of not returning oyster shells to the bay. Young oysters prefer anchoring themselves to the shells, where they grow to maturity.

Most of the oysters that remained were doomed by decades of pollution and sedimentation from poor logging practices.

But Ostrea lurida are returning, with much of the credit going to the two biologists, Anja Robinson and John Johnson. Ms. Robinson, a shellfish researcher since 1968 at the Hatfield Marine Science Center, knew there was a population of native oysters in Yaquina Bay. Her evidence: when commercial growers harvested the larger Pacific oysters, they sometimes came up with small native oysters growing on the shells. "As they shucked the Pacific oysters," she said,"they would just toss the native oysters."

Ms. Robinson would return the native oysters to the bay, or sometimes keep them in her laboratory tanks until they spawned and the tiny free-swimming oyster larvae attached to pieces of shell. Then she would return buckets of "seeded" shells, known as spat, to the bay.

She knew much more needed to be done but could not find anyone with the needed influence or money interested in helping, until Mr. Johnson came on the scene. Mr. Johnson reported to the Oregon Department of Fish and Wildlife's Newport office as the leader in shellfish in 1990. Through Ms. Robinson he soon became aware of how close the native oysters were to extinction. "It just absolutely flabbergasted me how little attention was being paid to them," Mr. Johnson said.

Oysters play a vital part in an estuary's ecosystem, Mr. Johnson said, filtering the water and growing together to form reef-like structures that provide habitat for a variety of creatures. To allow the only natural oysters capable of filling that role to become extinct was inconceivable to him.

Mr. Johnson's job put him in a position to take action. In 1982, state Fish and Wildlike divers gathered 300 adult native oysters from Yaquina Bay and put them in Netarts Bay, north of Pacific City, to determine if they could survive. They did.

With the help of a Netarts oyster grower, that seed population was spawned under controlled conditions to produce millions of tiny oysters to plant in Netarts Bay. "We put in six million and have since replanted the area a couple of different times," Mr. Johnson said. "They're flourishing and now re-established where they once were extinct." A small population of native oysters is now planted in Alsea Bay, near Waldport, and Mr. Johnson has also led efforts to improve the habitat for the remaining population of native oysters in Yaquina Bay. The shell piles will provide good places for native oysters to grow. And those piles are being "seeded" with baby oysters, which Mr. Johnson says will jump-start population growth.

A variety of public and private agencies have also given the oyster efforts a hand by donating money, material and expertise. Ms. Robinson says it is hard to believe how much progress has been made in just a few years. "I never believed this would be possible before John came," she said, "and I was struggling to do it all by myself."

LONG ISLAND AQUARIUM PROJECT

The Okeanos Foundation will open a public aquarium in Riverhead, L.I., with exhibits about local marine and freshwater systems and the species that inhabit them; rehabilitation areas for stranded marine wildlife; education facilities, a laboratory, and administrative offices. The opening is scheduled for the Spring of 1997.

The Aquarium will enable Okeanos to greatly extend its conservation messages to people of the Long Island region in an informative, enjoyable way. As a center for educators and researchers, the Aquarium will allow Okeanos to respond more fully to the numerous requests for educational programs and materials. Furthermore, the Aquarium will expand Okeanos' work with injured or sick marine animals.

Situated on the Peconic River the Aquarium will be an attractive and important addition in the revitalizion of downtown Riverhead and a boon to the local economy. Features will include:

LI Story Exhibits depicting LI's aquatic environments from freshwater streams to estuaries and finally to deep saltwater habitats

175,000gallon summer and winter deep water tanks featuring a replica of a local shipwreck and offshore species of fishes

exhibits of marine mammals and reptiles of Long Island

Hands-on Activity labs for youngsters

Floating Classroom and Laboratory

VISITOR'S CENTER - 278 E. Montauk Highway, P.O. Box 776,
Hampton Bays, NY 11946

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FOUNDED JAN. 1949

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Please note changes from our usual meeting room and events.

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SUNDAY, June 8, 1997	2:00 PM	SHELLING IN ELEUTHRA Steve Rosenthal ANNUAL MEETING: Election of 1997-8 Officers and Directors
SUNDAY, October 12, 1997	2:00 PM	See ANNOUNCEMENTS

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HIGHLIGHTS OF RECENT MEETINGS

March 9, 1997. The period before the opening of the meeting featured background music, thanks to last month's visitor, Steve Turre. Ed played the tape he had given to the Club, of music he and others played on shells and more conventional instrunents.

Curator Paula Mikkelsen of the American Museum provided some background on the recent incident in which a valuable shell was stolen from the Museum. The shell, presently placed in the family, Ovulidae, is Chimaeria incomparabilis. Only five specimens are known, of which the Museum has two, donated by Mrs. Didi Fleischner. Paula feels that the department's security must be improved. She ended by reminding members that the program for May will be a tour of the mollusk department, which she will conduct.

The program for the day was another "Jensonia" slide show, with audio tape, created by Dorothy and Norman Jensen. The subject is shells - real, replica and pictured - in art and decoration. Many of the slides are of artifacts in Dorothy's collection. Most are of glass, ceramic or metal, and some are antiques. Among the photos of art works featuring shells are pieces by members Ethelyn Woodlock and Tony D'Attilio, both professional artists.

The report on the April SOCIAL-AUCTION and HIGHLIGHTS on the May meeting will appear in the September NOTES.

ANNOUNCEMENTS

Our meeting on Sunday, June 8, is the ANNUAL MEETING - we hope you will plan to attend.

Because of the low attendance at our September meetings, the officers and directors decided to omit that meeting; many people are still on or just back from vacations, and beautiful fall weather is often a bigger attration than a meeting!

The American Museum has informed us that renovation of some of their meeting rooms make it impossible for them to assign us one meeting room for the coming year. We will meet at the Museum, but will not always be able to tell you in advance which room it will be. Therefore, please ask at the Information Desk when you enter the Museum for our meeting which room has been assigned for the New York Shell Club meeting. The September issue of the NOTES will carry the dates for the year's meetings.

BETTER DEAD THAN ALIVE

Al Scarpetti

It is rare to find a shell that is prettier when dead-collected then when live-collected, but such is the case with Conus tinianus Hwass 1792, a cone endemic to Jeffreys Bay, Cape, South Africa.

Because of its turbulent waters and frequent storms, thousands of shells are cast on its shores. Among these are Conus tinianus. When live it is a clouded brown and not an attractive cone, unlike so many of the cones. But when found dead on the beaches of South Africa this species has somehow broken out in beautiful colors - coral, orange, pink and rose. As a result, in the past this cone has been given the name Conus aurora, Lamarck 1810, and Conus rosaceus, Dillwyn 1817 (now absolute synonyms). Obviously, the authors were dazzled by the blaze of the unexplainable colors!

NOTES FOR NYSC - DECEMBER MEETING

Allen Aigen

Our December meeting gave participants the opportunity to pick through beach drift from Jeffreys Bay, South Africa (eastern Cape province, near Port Elizabeth). This is a world famous collecting locality, since over 700 species of both deep and shallow water shells can be found on the beach. Many species are known only from beach shells.

The quality of the shells varies from fresh to badly worn. Since I collected every gastropod and chiton species I could find in the sample, many were represented by only one poor specimen. Other people found species which I did not, simply due to luck. All the shells I found fit into one inch cubes, although some multiple specimens required larger boxes. Since the sample had been screened, there were few micro molluscs, which are notoriously difficult to identify anyway.

I identified my shells by using Richard Richard Kilburn's excellent "Sea Shells of Southern Africa", 1982, which is available on loan from the NY Public Library. I found 112 gastropod and four chiton species, representing 56 genera identified to species, and including only about 20% unidentified-to-apecies, most of which were turrids (or collumbellids misidentified as turrids?)

The following list (ordered per Kay Vaught's "A Classification of the Living Molluscs") is by Family, number of genera (identified to species), number of species identified, and number of unidentified species:

FAMILY	No. of genera (identified to species)	No. of species identified	No. of unidentified species
Fissurellidae	3	4	0
Patellidae	1	3	0
Trochidae	3	6	2
Turbinidae	3	3	2
Phasianellidae	1	2	0
Littorinidae	1	1	0
family?	0	0	1
Rissoidae	1	1	1
Cerithidae	1	1	0
Turitellidae	1	1	0
Siliquaridae	1	1	0
Vermetidae	1	1	0
Crepidulidae	1	2	0
Cypraeidae	1	1	0
Naticidae	1	2	0
Ranellidae	2	2	0
Cerithiopsidae	1	1	0
Triphoridae	1	1	0
Epitoniidae	1	1	0
Muricidae	5	7	0
Buccinidae	2	4	0
Collumbellidae	2	5	3
Nassariidae	2	12	0
Fasciolaridae	0	0	1
Olividae	2	3	0
Marginellidae	4	7	0
Mitridae	1	2	0
Costellaridae	2	2	0
Cancellariidae	2	2	0
Conidae	1	2	0
Turridae	2	3	9
Terebridae	1	1	0
Pyramidellidae	1	1	2
Scaphandridae	0	0	1
Siphonariidae	1	4	0
Chitonidae	1	1	0
Ischnochitonidae	2	3	0

1997 SUMMER & FALL SHELL SHOWS AND MEETINGS -

listing provided by DONALD DAN, COA Award Comm.

Jul. 5 - 6 Keppel Bay Shell Show
Yeppoon, Queensland, Australia
Jean M. Offord, 277 McDougall St.,
N. Rockhampton, Qld. 4701, Australia (79) 283-509

Jul. 13-18 Conchologists of America Annual Convention
Captiva, Florida
Anne Joffe, 1163 Kittiwake Cicle
Sanibel, FL 33957 (941) 472-3151

Jul. 26-27 **Townsville Shell Show**
Townsville, Queensland, Australia
Glenda Rowse, 19 Farrell Street
Kirwan 4814, Queensland, Australia (77) 732-817

Aug. 15-17 **Jacksonville Shell Show**
St. Augustin, Florida
Dolores Jewell, 3165 Victoria Park Road
Jacksonville, FL 32216 (904) 443-6086

Aug. 21-23 **Jersey Cape Shell Show**
Stone Harbor, New Jersey
Jersey Cape Shell Club, P.O. Box 124
Stone Harbor, NJ 08247 (609) 653-8017

Sept. 21-22 **International Shells & Fossils Bourse**
Ottmarsheim, France
Michel Rioual, 2 Rue des Vergers
68490 Ottmarsheim, France (3) 89-26-16-43

Sept. 26-28 **Annual German Shell Fair**
Schwarzenfeld, Germany
Josef Lingl, Fichtenstrasse 6
D-92521 Schwarzenfeld, Germany Tel/FAX (9435) 1843

Sept. 27-28 **Central Florida Shell Show**
Orlando, Florida
Jake Dominey, 700 Tam O'Shanter Drive
Orlando, FL 32803 (407) 890-3033

Oct. 25 - Nov. 2 **Oregon Shell Show**
Portland, Oregon
Maxine Hale, 347 N.E. 136 Ave.
Portland, OR 97230 (503) 253-5379

Oct. 25 **British Shell Collectors' Club Shell Show**
London, England
Kevin Brown, 12 Grainger Road
Isleworth, Middlesex TW7 6PQ, England (181) 568-8333

Nov. 1- 2 **Philadelphia Shell Show**
Philadelphia, Pennsylvania
Al Schilling, 419 Linden Ave.
Glenside, PA 19038 (215) 886-5807

Nov. 21-23 **North Carolina Shell Show**
Wilmington, North Carolina
John Timmerman, 32 JEB Stuart Drive
Wilmington, NC 28412-1700 (910) 452-0943

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FOUNDED JAN. 1949

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Full Membership $12.00 per year
Full Family Membership $15.00 per year
Corresponding Membership $10.00 per year
Foreign Membership $12.00 per year, paid in U.S. currency

The Treasurer-Membership officer should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

PLEASE NOTE: There may be differences in dates and/or places for meetings from those given below. Consult your current issue of NYSC NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

1997 - 1998

October 12, 1997
November 8, 1997
December 14, 1997
January 11, 1998
February 8, 1998
March 8, 1998
April 12, 1998
May 10, 1998
June 14, 1998

With the exception of this year's November and April meetings, (see NOTE below), meetings are held at the American Museum of Natural History, Central Park West at 79 Street, New York City, starting at 2 PM. Visitors are always welcome

On our meeting days, you may gain admission to the Museum without paying the Museum's admission fee by presenting your NEW YORK SHELL CLUB membership card.

Most of our meetings at the Museum will probably be in the Blum Classroom on the 1st floor near the 77th Street entrance to the Museum. As in the past two years, our November meeting is planned as a visit to the Philadelphia Shell Show on Saturday, November 8, probably a bus trip in conjunction with the Long Island Shell Club. Our April, 1998 meeting will be our annual Auction and Social, which is not held at the Museum.

NOTE: NEW YORK SHELL CLUB pins are available; $3.50 at a meeting.

Mail orders ($4.00 per pin) should be sent to:

Theta Lourbacos, NYSC
66 West 94 St., Apt. 20C
New York, NY 10025

The NEW YORK SHELL CLUB meets on the second Sunday of the month, October to June, at the American Museum of Natural History, New York City (unless otherwise noted). On meeting days your NYSC membership card will provide admission to the Museum without payment of the Museum's admission fee.

Please note changes from our usual meeting room and events.

PROGRAM SCHEDULE

SUNDAY, October 12, 1997	2:00 PM	SHELLING IN HONG KONG, etc. Melvin & Sylvia Springer
SATURDAY, November 8, 1997	Proposed field trip to Philadelphis Shell Show - See NYSC No. 341 for a report on last year's show.	
SUNDAY, December 14, 1997	2:00 PM	THE YO-YO CLAMS OF FLORIDA Curator Paula Mikkelsen, Am. Museum Natural History

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NOTE

NEW YORK SHELL CLUB annual election of officers and directors, originally scheduled for the June meeting, was postponed to the October meeting because of the lack of a quorum.

NYSC ANNUAL SOCIAL AND AUCTION, APRIL 13, 1997

The annual auction meeting was held at Dorothy Jensen's Broadway Dance Studio in Astoria, Queens. Auctioneer Mel Springer knocked down more than 125 items, including many more volutes from the collection of Mansfield and Celia Fuldner. In addition to these and other fine shells were books, shell-related artifacts and shell cabinets.

The sale table, offering shells at prices from $2 to $10, was busy, as was the bargain table, with good values at $1. The snack table was another popular stop.

The outstanding shells in the auction were:

Voluta kurodai,3-1/8" $175
Voluta bednalli,4½" $57
Voluta floridana,(fossil),5" $56
Livonia mammilla,11" $50
Voluta mirabilis, $46
Conus plicatus, $45
Strombus thersites,6" $40
Voluta africana, $36
Voluta aulica, $32
Voluta roadnighti, 5-5/8", $30
Ericusa sowerbyi, 6½", $30
5 Lyropecten nodosus, $26
Charonia tritonis variegata,7-3/8"$25
Cassis madagascarensis, 10½" $24

A door prize and a raffle rounded out the business of the day.

The following are the people and businesses who donated their services and/or material to the 1997 Auction and Social.

Dorothy and Robert Janowsky, Mal de Mer Enterprises
Sue Hobbs
Phillip W. Clover, Dealer, P.O. Box 83, Glen Ellen, CA 95442
Dan Spelling, Specimen Shells Sales, 1094 Calle Empinado,
Novato, CA 94949
J. Ross Mayhew, Schooner Specimen Shells, P.O. Box 20005,
349 Herring Cove Rd.
Halifax,Nova Scotia,B3R2K9
Canada

Nick Katsaras
Edward Cowles
Milton Werner
Dr. Edward Dunlap
Richard J. Kelly, 622 S. 8th St. New Hyde Park, NY 11040
Allen Aigen
Carl Ehrlich
Romuald Czepulkowski

Finally, we thank Dorothy Jensen for the use of her studio this year, a donation to New York Shell Club this year and in many past years.

Milton Werner, Secretary

HIGHLIGHTS OF RECENT MEETINGS

May 11, 1997. Carl Ehrlich reported that a member of the Mineral Club had looked at the Fuldners' mineral collection, rating it good but not great. Carl is storing the collection and Romuald has the index cards. Romuald also noted that he is storing the Club library, and that he may be forced to find another place to live. This might result in the need to find another place for the library. Carl said he no longer has storage space to spare.

Carl introduced Michael Small, visiting from Ottawa.

The program for the day was a tour of the facilities for which Paula Mikkelsen is responsible as Curator of Recent Mollusks. One stop was the room that is being converted into a laboratory that will serve the needs of her current research projects. One is a study of bubble shells and the other a study of gastropod eyes. The latter will include the serial sectioning of eyes into slices one micron thick.

Paula noted that Kay Vaught's collection had been accessed by the Museum, and is awaiting the attention of volunteer sorters and catalogers. She described a recent dredging and trawling trip to the Dry Tortugas, and also said that a replacement for Walter Sage had been hired, and that he would start work in July. He is Jay Cordero, and his title will be Collection Manager. Paula also noted that she is the only research SCUBA diver on the Museum staff.

The group then turned its attention to the collection, making requests for looks into drawers housing particular families and species.

June 8, 1997. Since there was not a quorum present, the annual election had to be postponed to the October meeting. For the Nominating Committee, Milton Werner reported that the only change proposed in the roster of officers and directors would be the nomination of Carl Ehrlich for president.

Romuald Czepulkowski had on display several live Succinea putris (L. 1789) that he had collected only days before along the Appalachian Trail near the Swamp River in Dutchess County, New York. The soft parts will eventually be preserved, and some will go into the Museum's collection.

The speaker for the day was Steve Rosenthal, who reported on a shelling trip to Eleuthra in April, 1996. The Island, an hour's flight from Miami, is 110 miles long and about 2 miles wide. Steve chose shelling spots in the south one-third of the island. Collecting on the Caribbean side is especially good, and he came back with some species not found elsewhere in the Caribbean. His photographs covered localities and general scenery, and he had borrowed several underwater photos of live specimens taken in the same area.

Ed showed five slides "left over" from his recent presentation on pre-Columbian art. Most were of ceramic or sculpted artifacts in which shells were used for decoration or symbolism.

Romuald reported that he would soon be forced to move, so he will lose the extensive storage space in which he is holding the Club library and auction material. Carl Ehrlich said he would be able to give it space in his basement or warehouse. Concerning the fossils and minerals among this material, he suggested holding joint auctions with the fossil club and mineral club. He also said he would call Theta Lourbacos about the money owed to Virginia Stuart from the sale of shells from the Fuldner collection at the April auction.

The door prizes were fossils in the families Pectinidae, Lucinidae and Tellinidae, won by Irv Hoppenwasser, Milton Werner and Phil Tates.

Milton Werner, Secretary

DOROTHY RAEIHLE 1909 - 1997

Among the members who inspired, shaped and colored the New York Shell Club through its strongest years, none added more to its life than Dorothy. She was close to the center of the web of friendships that sprang to life during her long active member ship, starting in the Club's seventh year. She was a clear voice in the guidance of Club business, before and after her term of two years as president. And it was no surprise that she was able to make the jump from collector to malacologist. Her scientific presentations at meetings of the American Malacological Union were received with interest and respect. Her specialty was raising generations of marine gastropods in home aquariums, and making meticulous notations of dates, diets, egg laying, growth, behavior and all of her other keen observations. Her findings were clearly illustrated in the magnificent photographs made by her husband, George. At AMU, too, she made close friendships, among both amateur and professional members.

Much of Dorothy's contribution to the Club lay in her editorship of this journal. Her keen eye for both details and direction raised Shell Notes to a new level of professionalism. Typically, she took on the whole job, typing every page of every issue. For many of her years at this task, she was typing on stencils - and turning out 10 commendable issues every year. She didn't quit 'till the arthritis in her hands made it impossible to continue.

Even through years of confining physical troubles, she went right on being cheerful, open-hearted, interested in the affairs of both the New York and Long Island Shell Clubs, and in touch with the personal and conchological lives of her shelling friends around the country, the corner, and the world. Dot and George made shelling more rewarding and more fun than it had been before they arrived on the scene, and made the serious study of mollses a more advanced pursuit.

Milton Werner

ANTHONY D'ATTILIO 1909 - 1997

Tony D'Attilio, a founding member and the second president of the New York Shell Club, passed away at the end of June. He and his late wife, Rose, were mainstays of the Club for may years. When he retired and they moved to California to be near their grandchildren, the San Diego Shell Club and the Natural History Museum gained a devoted and enthusiastic worker. He collaborated with George Radwin on a number of scientific papers; several new species bear their names as co-authors.

Tony was a superb artist. He owned a small company that produced "carved glass" decorative panels and other objects bearing frosted designs dry-etched by means of a finely controlled sand-blasting process. Examples of his work could be seen in Pennsylvania Railroad cars and in the dining salon of the S.S. United States. Some of our members are proud owners of glass dishes engraved with his highly realistic shell designs.

In a letter he wrote me last December, Tony reminisced about early times in the Club and the old-timers he rememberes. We were much the richer for his presence among us.

The New York Shell Club extends our condolences to Tony's daughter, son, and grandchildren.

Edward Cowles

BROWN TIDES: NONTOXIC BUT STILL KILLERS

reprinted from SCIENCE NEWS, VOL. 152 p. 203

Red tides are the work of dinoflagellates. Green films are cyanobacteria. Brown todes are formed by still another stripe of cell: marine plankton calles chrysophytes, also known as golden-brown algae.

Unlike cells in the red and green blooms, brown tide cells do not produce a neurotoxin; however, their chocolaty blooms are no less devastating. The tiny cells grow to incredible densities--1 million to 2 million cells in a milliliter--and shade the plant life in shallow bays. The effects rattle the food chain.

In 1985, the first known brown tide appeared off Long Island, NY, and destroyed the local bay scallops industry. In 1989, the bloom of another golden-brown species appeared off part of Texas' Gulf Coast--remarkably, it hasn't left yet. That bloom has destroyed the beds of seagrass that act as a nursery for fish larvae.

Although brown tides kill by a different means than other algal blooms, researchers suspect that they are also linked to an increased flush of nutrients into coastal waters.

In the October GLOBAL CHANGE BIOLOGY, Julis LaRoche and her colleagues from Brookhaven National Laboratory in Upton, N.Y., describe 11 years of monitoring the ebb and flow of brown tides around Long Island. The key seems to be the flow of groundwater. The researchers suggest that low groundwater, from sparse rainfall, increases the amount of organic nitrogen available, favoring brown tides.

Christine Mlot

QUAHOG AND CORMORANT:
A LETHAL ENCOUNTER?

by Wendelin Giebel and Ronald Dilg

In July 1990 while near Cinder Island, two miles west of Jones Inlet on the south shore of Long Island, NY, we happened to spot a double-crested cormorant in obvious distress. The bird was sitting on a piling with a quahog clamped tightly on its throat pouch. The clam dangled heavily in front of its chest.

The cormorant entered the water as we approached and was retrieved after a short chase. Exhausted, it seemed unable to hold its head erect with the burdensome clam attached. We severed the torn throat tissue along with the quahog and released the bird. Part of its lower mandible was found inside the clam.

Perhaps while diving the bird saw the clam's siphons and mistook them for another prey item. The bird's mandible might have snapped off as it desperately pulled the clam from the mud in its struggle to regain the surface. The lower mandible is essential for clasping fish and feeding young as it acts as a collecting dish for partially digested liquids which both parents offer to the chicks. Although the bird flew off after its release, the profuse bleeding, torn throat pouch and broken lower mandible would seem to add up to insurmountable odds against its survival.

* * * * * * * * * * * * *

Banding data from the fifties suggests that double-crested annual mortality after the first year may be as high as 26 percent. We wonder what role the quahog plays in this mortality rate. The known foraging radius for this species is five to 10 miles. In any case we will be watching for the cormorant we rescued on Cinder Island.

(reprinted from UNDERWATER NATURALIST, Vol. 20, No. 2)

EDITORIAL NOTE: Allen Aigen, author of the following article, is willing to bring specimens of the species described to a future NYSC meeting. Those interested should telephone him at 718-979-7625; if there is sufficient interest, the exhibit will be listed in the next issue of the NOTES.

STROMBOID EVOLUTION IN THE FLORIDA ICE AGE

By Allen Aigen

Although it is commonly assumed that evolution works too slowly to see it happen we can occasionally see the process as caught by the fossil record. Most of the fossil record shows stasis, or hundreds of feet of rock over hundreds of miles with all the same fossil types showing virtually no change from the top of the rock unit (formation) to the bottom. But the unit above it may show a different suite of fossils, with no indication of how the change happened. This pattern is called punctuated equilibrium, and is the rule for most of the fossil record. In southern Florida, in a basin that is now occupied by the Everglades and Lake Okeechobee, we can see just how quickly change can take place, and some of the details of the process (see chart following). The best part of this is that the changes are in collectible shells, most of which are closely related to living species.

I have been collecting shells from ice-age deposits in southern Florida since 1991, and I have written about it, including a book review, for these Notes. Although many people have described shells from the Florida Pleistocene, Ed Petuch gets most of the credit (or blame) for the current proliferation of species names. We use the names to order the material, and to talk about the shells. The names which we use therefore reflect much collecting, comparing and thinking, and many assumptions concerning the evolution of these forms and their relationship to each other.

The stromboids form a particularly interesting group to work with. They are restricted to tropical marine areas, are large and complex looking, and they often occur in large quantities. We also have a fairly good idea of the limits of living species, although even live ones are sometimes argued over. There are only two subgenera, both in the genus *Strombus* , which we must consider: *S. (Strombus*), and *S. (Eustrombus (=Tricornis)).* See the photos following this article.

Strombus (S) alatus Gmelin, 1791, the Florida fighting conch, is a living species which evolved probably at the beginning of the ice age. It is a common species in the Caloosahatchee Formation, which began with the first small glaciation which started the Pleistocene (I have no data on earlier occurences). The Caloosahatchee form is virtually identical to shells that can be collected now on Sanibel Island, on Florida's west coast. But only the spineless varieties are found in the Caloosahatchee, not the forms with spines which now generally predominate. The spined and spineless forms are considered, by all sources I've come across, to be one species. Why some are smooth and some sharply spined I do not know. You can find interbreeding colonies with everything in between, and some colonies with one form predominating. Note that *S. pugilis* Linne, 1758, the West Indian fighting conch, is considered to be a separate, distinct species that is very hard to differentiate from *S. alatus*. It apparently invaded southern Florida from the Caribbean fairly recently. *S.(E.) raninus* Gmelin, 1791, the hawk wing conch, is also unknown from the early and mid Pleistocene of southern Florida.

S. alatus is very variable in size. I have Caloosahatchee forms between 60 and 85mm. Modern specimens run between 40mm dwarfs and 120mm giants. The surface on Caloosahatchee specimens can have strong revolving lirae, but these are generally restricted to near the lip, and to submature specimens. The height of the specimens is also relatively variable, some being noticeably tall and narrow, others stout. Spires can have strong varices, or be very even.

Ed Petuch, who is considered by many to be a splitter, has not come up with a new subspecific name for the Caloosahatchee form of *S. alatus*, although he considers that the total lack of spined forms does distinguish them from modern forms, as did Olsson in his 1953 monograph on the Caloosahatchee. (Note that Olsson helped distinguish *S. alatus* from *S. pugilis*, by noting the total lack of spined forms. It was previously considered a subspecies.) You can't tell the age from a single specimen, however. If you need a whole population, you can't make an acceptable name difference for fossils, even if they were genetically different. But since the differences may be purely environmental, it is not reasonable to split out the Caloosahatchee forms by name.

The Caloosahatchee ended with a drop in temperature and a drop in sea level, as the second ice age glacier built up. The formation above it, the Bermont, has a distinct, relatively depauperate fauna, representing the return of survivors and newly evolved species. The Bermont was restricted to the southern Florida basin, with only little water going in and out, so that new species did not have much competition, and could spread rapidly. The lower part of the Bermont has the best fauna. *S. alatus* is still common, and still has forms identical for all practical purposes to the underlying Caloosahatchee forms. But now there is a new element. Spined forms, and all varieties in between, are also common. The spined forms are identical to modern types. Since the species has its full complement of varieties, it is not considered to be distinct from the modern form.

Compared to the long lived *S. alatus*, a few distinct new varieties of stromb are found only in the Bermont Formation. One is a very similar but very wide, fairly smooth form, with a shallow stromboid notch, and with a disproportionately elongate, very narrow spire (which is often broken off, or may be a variable.) At first glance, this is merely another form or variety of the protean *S. alatus*. However, this form is restricted to the Bermont, where it is common. It can usually be clearly distinguished from *S. alatus*, but it too is variable, and there are some questionable in-between specimens. Petuch, 1991 named this form *S. evergladesensis*, the Everglades conch, and as is generally his style, made little indication of the variability of the species. His description is based upon a select few homgeneous specimens.

What if , as in the spined versus smooth forms, this fat form was an interbreeding part of the *S. alatus* population? Do the questionable forms forms show a real connection, or cross breeding, or do we simply have too little preserved of the species to show that they are distinct? If it split off as a good separate (non-interbreeding) species, it must have done so in a very short amount of time (perhaps 10000-20000 years) and in a restricted area. But that is consistent with what we can see in other cases, and with the great deal of physical stress which all the species underwent at the the beginning of the second major glaciation. I am willing to agree that *S. evergladesensis* can be considered a separate species, but I would also be happy to consider it to be a subspecies.

How can you attain a level of certainty as to the proper status of this form? Collect a few hundred or more specimens from each of a few dozen localities and run a very detailed statistical analysis of many measurements from each shell. But first find a college student taking a graduate level statistics course who needs a project, because this work is boring!

One species of Petuch, 1991, I do not hesitate to relegate to variety status. *S. lindae,* Linda's conch is a relatively rare form of relatively small, very narrow *S. alatus*, the type specimen of which has strong spiral lirae on the body whorl dorsum. But Petuch (1992) subsequently admitted a smooth variety into the specific limits of S. lindae. This varient , although extreme, is not different from what can be found in the Caloosahatchee. Basing new species on insufficient material is likely to lead to a proliferation of junior subjective synonyms, especially when you deal with variable species. Also the fact that this is a form species, with no opportunity to compare living populations, makes caution more necessary.

Two species of very large Bermont strombids I have not collected. . *S.(E.) williamsi* Olsson & Petit, 1964, (Williams conch), is stout with a relatively short conical spire and a crown of spines around it on the pentultimate whorl. It is relatively uncommon, and perhaps its large size makes preservation on a dredge pile chancy, except as unidentifiable fragments. *S. (E.) gigas* Linne, 1758, the queen conch, is also rarely found. It is apparently still too poorly known for even Petuch to name, although he considers it to be a new subspecies.

A Bermont species, *S.(E.) mayacensis* Tucker and Wilson,1933, the Port Mayaca conch, which looks like the modern milk conch, *S.(E.) costatus* Gmelin, 1791, is reasonably easy to find, but not as good specimens. The strong heavy lip tends to break off. I have specimens between 125 and 180 mm of this variable species. The spire can be rather broad, with the spines mostly covered, to narrow with rounded spines. Comparing two specimens of the same length, one with a high spire, one with a low spire, you can see why Petuch, 1988, listed the high spire one as a tentative new species. . It can be distinguished from the modern *S. costatus* mainly by its higher spire and stronger lirae on the dorsum, although the shape of the lirae varies widely also.

A small species, which looks like a miniature, narrow spired *S. mayacensis*, is *S.(E.) diegelae* Petuch, 1991, Diegel's conch. It seems to represent a good, distinct, noninterbreeding population, although at 90 to 120 mm, it isn't that distinct. It is fairly consistent in shape, and easy to recognise. Submature specimens of both species are rather variable, and may be impossible to place with certainty.

Both *S. mayacensis* and *S. diegelae* probably evolved from an uncommon Caloosahatchee species, *S. (E.) leidyi* Heilprin,1887. This species looks like *S. mayacensis* with a lirate but spineless conical spire. *S. leidyi* was incidentally synonomized with *S. costatus* by Abbott in his American Seashells, based on an incorrect reference to *S. leidyi* in Bermuda!

Going a step backward in time to the late Pliocene, the parent of *S. leidyi* has been named *S.(E.) hertweckorum* Petuch 1991. It can't be easily distinguished from *S. leidyi*. Needless to say, further collecting of this fascinating group will be necessary to better define species boundaries, and to better understand the dynamics of their evolution.

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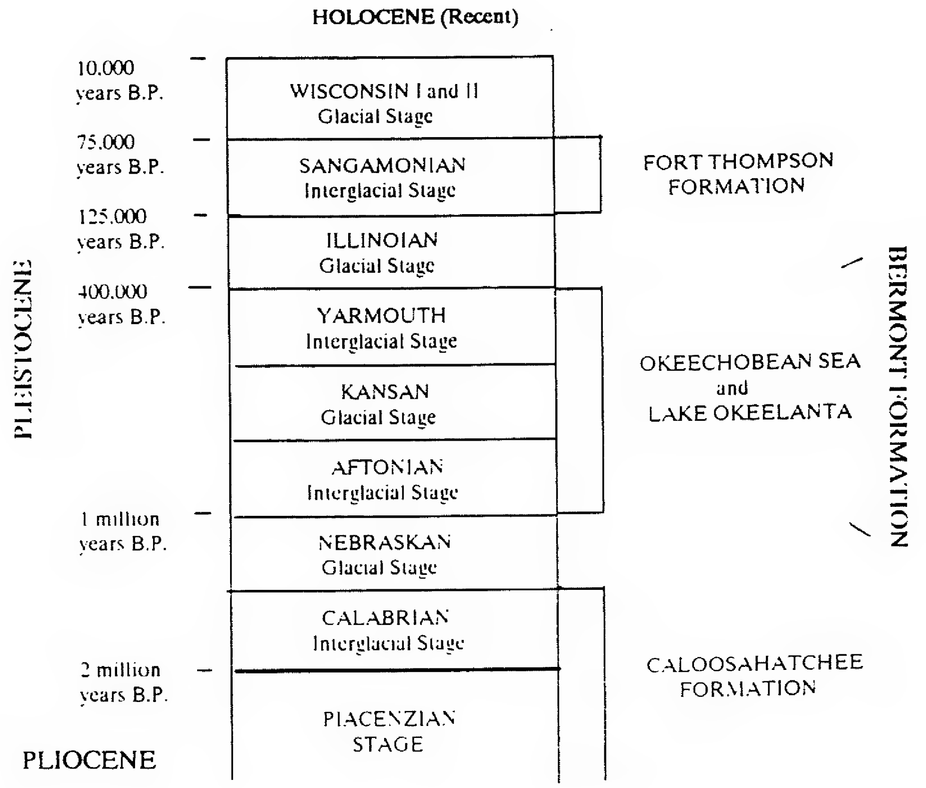
6 THE EDGE OF THE FOSSIL SEA

Pleistocene time line, showing the American glacial and interglacial stages and southern Floridian geological formations. (B.P. = before present time)



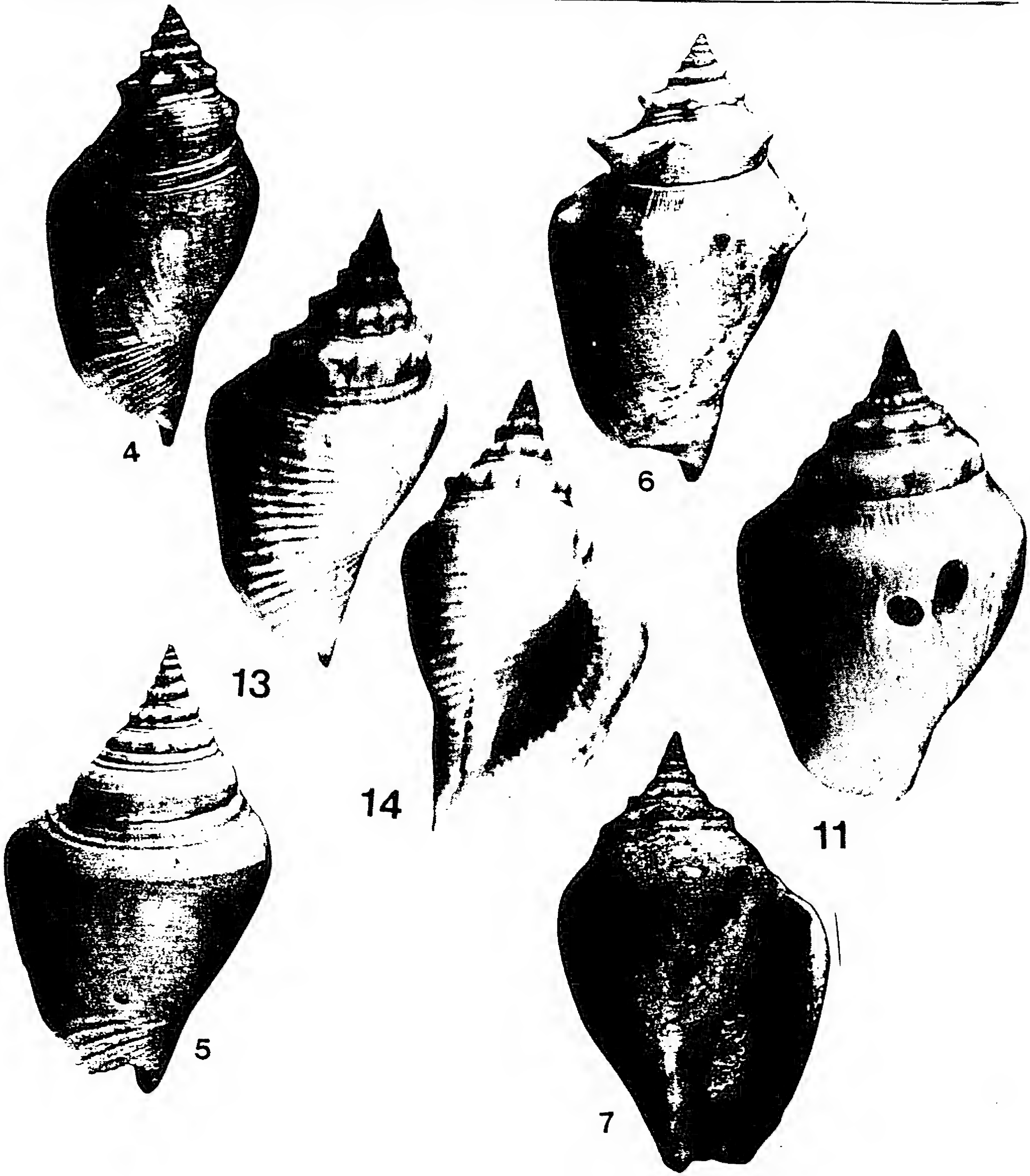


Plate 1. *Strombus (S.)* species, Bermont Formation. From Petuch 1988, 1991, 1992.

fig. 4. *S. lindae*, (varient of *S. alatus)*, 64 mm.
fig. 13, 14. *S. lindae*, holotype, 54 mm.
fig. 6. *S. alatus*, spined form, 86 mm.
fig. 5. *S. evergladesensis*, varient, 83 mm.
fig. 7, 11. *S. evergladesensis*, holotype, 72 mm.

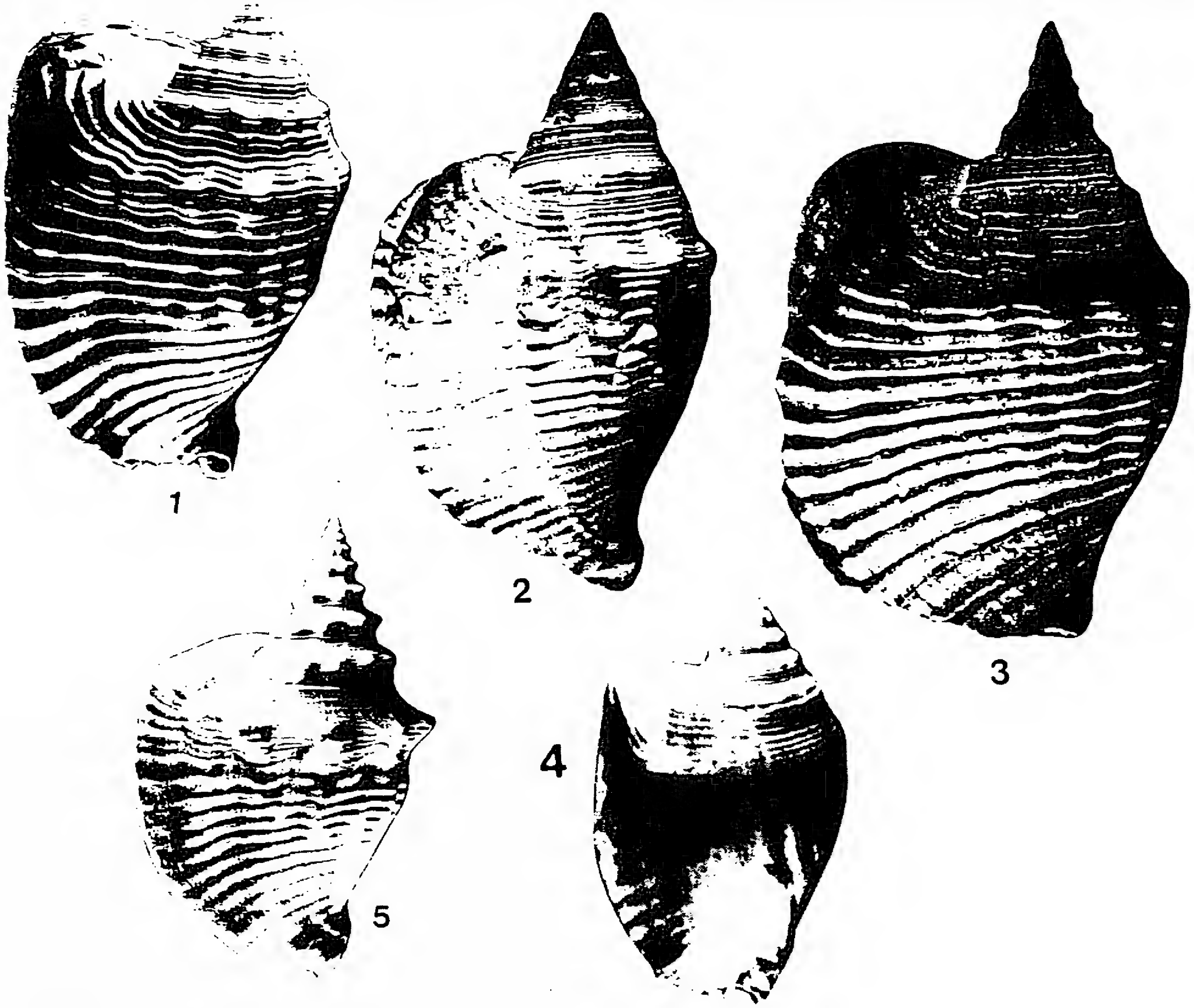


Plate 2. Plio-Pleistocene *Strombus (Eustrombus)* species, from Petuch, 1988, 1991, 1992.

fig. 1-3. *S. mayacensis*, Bermont Fmtn., 154, 187, and 179 mm.
fig. 5. *S. diegelae*, holotype, 94 mm., Bermont Formation
fig. 4 *S. hertweckorum*, 138 mm, Pliocene.

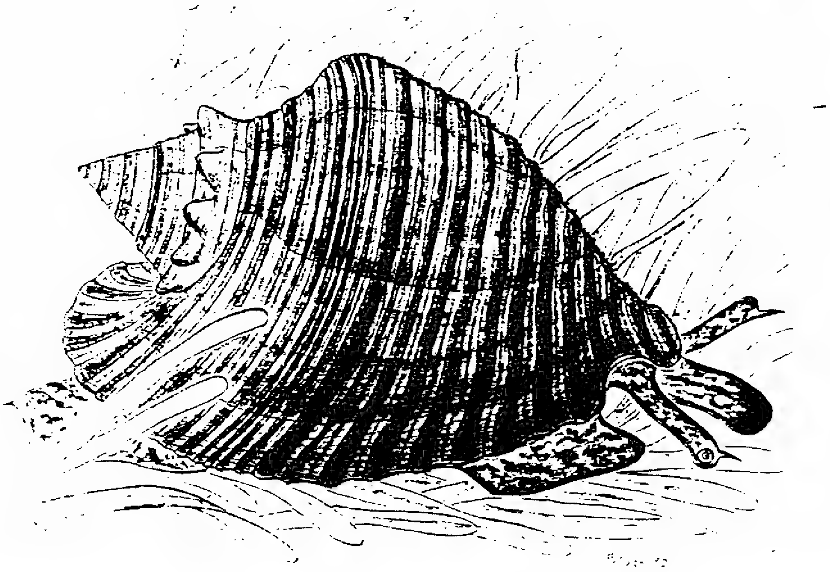


Figure 24. A Williams' Conch (*Strombus williamsi* Olsson and Petit) tumbles through a dense bed of Turtle Grass (*Thalassia*) growing off the coast of Miccosukee Island. The conch uses its flexible proboscis to browse on algal films growing on the grass blades. Two pipefish mimic blades of *Thalassia* while waiting for their prey.

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NEW YORK
SHELL CLUB
INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

PLEASE NOTE: There may be differences in dates and/or places for meetings from those given below. Consult your current issue of NYSC NOTES for changes. The April meeting, our annual Social/ Auction, will not be held at the Museum.

1997 - 1998

October 12, 1997
November 8, 1997
December 14, 1997
January 11, 1998

February 8, 1998
March 8, 1998
April 12, 1998
May 10, 1998
June 14, 1998

With the exception of this year's November and April meetings, (see NOTE below), meetings are held at the American Museum of Natural History, Central Park West at 79 Street, New York City, starting at 2 PM. Visitors are always welcome

On our meeting days, you may gain admission to the Museum without paying the Museum's admission fee by presenting your NEW YORK SHELL CLUB membership card.

Most of our meetings at the Museum will probably be in the Blum Classroom on the 1st floor near the 77th Street entrance to the Museum. As in the past two years, our November meeting is planned as a visit to the Philadelphia Shell Show on Saturday, November 8, probably a bus trip in conjunction with the Long Island Shell Club. Our April, 1998 meeting will be our annual Auction and Social, which is not held at the Museum.

NOTE: NEW YORK SHELL CLUB pins are available; $3.50 at a meeting.

Mail orders ($4.00 per pin) should be sent to:

Theta Lourbacos, NYSC
66 West 94 St., Apt. 20C
New York, NY 10025

The NEW YORK SHELL CLUB meets on the second Sunday of the month, October to June, at the American Museum of Natural History, New York City (unless otherwise noted). On meeting days, your NYSC membership card will provide admission to the Museum without payment of the Museum's admission fee.

Please note changes from our usual meeting room and events.

PROGRAM SCHEDULE

SUNDAY, DECEMBER 14, 1997	2:00 PM	THE YO-YO CLAMS OF FLORIDA
SUNDAY, JANUARY 11, 1998	2:00 PM	SHELL EXCHANGE PROGRAM
SUNDAY, FEBRUARY 8, 1998	2:00 PM	WHY MOLLUSKS HAVE THEIR COLORS Dr. Gary Rosenberg
SUNDAY, MARCH 8, 1998 NOTE: MEETING WILL BE HELD IN THE LINDNER THEATER	2:00 PM	David Doubilet, famous undersea photographer (details in March NYSC NOTES)

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Mailing of this issue of the NOTES was delayed because of late receipt of copy and reluctance to add it to the bulk of Holiday Season mail.

HIGHLIGHTS OF RECENT MEETINGS

October 12, 1997. Ida Cianci introduced Robert Lyon, present as a guest. Another guest was a visitor from Russia, introduced by Carl Ehrlich. Mel Springer distributed flyers accouncing the coming Long Island Shell Club auction.

The program was presented by Mel. He described, with slide accompaniment, the Springers' most recent semi-annual collecting jaunt to far places. This time it was Fiji, Tonga and Western Samoa. They had no trouble finding English speakers anywhere.

Fiji consists of over 600 islands. Mel and Sylvia's roost was in southern Fiji, a hotel on the Coral Coast. The collecting was good on a reef that is flat close to the shore. Along with pictures of the locale and the shell finds were some of an orchid nursery financed by Raymond Burr.

In the annual election of officers, deferred from June, the Nominating Committee presented a slate on which the only new name was that of Carl Ehrlich for president. There being no other nominations from the floor, the secretary was empowered to cast one ballot for the election of the entire slate. Thanks were extended to Ed Cowles for having undertaken a second stint as president.

Carl began his term in office by noting that Theta Lourbacos, who is not in strong health, could use occasional help. Ida volunteered. Carl said that he would look for opportunities to get some advertising for the Club.

Al Scarpetti announced that Henry Gordon has shells and books that he would like to sell.

Carl displayed a Conus bengalensis that he had collected off Flores in Indonesia, at a depth of 80 feet. He believes that his find represents an extension of the range of bengalensis.

A November meeting was not scheduled since a number of our members planned to attend the Philadelphia Shell Show on Saturday, the day before our usual meeting day.

ON THE WEB ** ON THE AIR

WORLD SPECIES LIST MUSEUM HOME PAGE (AMNH)

http ://envirolink.org./species

MUSEUM HOME PAGE: http://www.amnh.org (Am. Museum Nat. Hist.)

COMING ATTRACTIONS

David Doubilet, underwater photographer who roves the world's seas for National Geographic magazine, will present the program for our New York Shell Club Meeting on March 8, 1998. We have reserved the Lindner Theater at the American Museum for this program, anticipating a large and eager audience. His photography captures the revelations, the astonishments and the beauties of the marine universe. His photographs will not be chosen for shell collectors alone, but for all who find fascination in the works and ways, and shapes and colors, of nature's water world. (Additional information in March, 1998 NOTES)

and - DON'T FORGET - NYSC ANNUAL SOCIAL AND AUCTION

APRIL - 1998

WHY SUNLIGHT FADES SHELLS

(reprinted from Shell-O-Gram, Sept.-Oct. '97)

Shortwave ultraviolet (UV) radiation, in the wavelength range of about 280 to 320 nanometers (nm) is responsible for the alteration of pigment molecules resulting in fading of shells exposed to direct sunlight (not to mention drapes, house paint, colored paper, and various other pigmented materials). This same wave-band is responsible for sunburn.

This radiation has enough energy both to penetrate into many materials (as opposed to reflecting from them), and to cause alternations in molecules which absorb them. Longer wave UV is lower energy radiation with wavelengths shorter than 280 mm, but fortunately it is absorbed by the atmosphere, so it doesn't reach the earth's surface.

The 280-320 mm range is largely absorbed by glass, which is why a shell on a windowsill inside a house fades much more slowly than a shell outdoors.

PUBLICATION -- NEW BOOK

A new book Coastal Paleoceanography of Eastern North America (Miocene-Pleistocene) has been written by Edward Petuch. This book chronicles the Neogene period that comprised the Miocene, Pliocene and Pleistocene epochs and encompasses the past 23 million years - the most exciting and dybamic periods in the earth's history. The soft bond book has drawings by the author of shells, maps, photographs of areas, a 750 molluscan index of fossils and 70 plates. Chapter 5 restates his now out-of-print "Field guide to Echoporas" and Chapter 7 pertains to Coral Zonation and Ecology. The book is $59.95 plus $4.00 for shipping and may be ordered by calling Kendall-Hunt Publishing at 1-800-228-0810.

NOTE: The following reprinted from NYSC NOTES #324, Sept.1992

The Formation of the New York Shell Club by Dr. Walter H. Jacobs

(reprinted from New York Shell Club NOTES No. 28, January 1957)

In this, the ninth year of our existence, it might be appropriate that a short history of our organization be read so that posterity will ever be acquainted with the formation of the New York Shell Club.

In the Fall of 1948, after a summer spent on and about the beaches of Connecticut, the various common shells became a challenge to my modest knowledge of natural history. Books at the library did not help much with the problems of identification. The next call was to the American Museum [of Natural History]. I was advised that no group or club was active in the city that was interested in shells, but information was given concerning the American Malacological Union. We were told to contact Mrs. Imogene Robertson, the secretary, at Buffalo. Mrs. Robertson answered that she too knew of no organization interested in Mollusca, in or about New York, but she did advise that I get in touch with a local shell enthusiast, Mr. Morris K. Jacobson of Rockaway Beach. We called Mr. J., our interest in shells was explained and an appointment was made to meet one evening in Grand Central Station, near the information booth, each of us to carry an identifying object, of course a shell!!

We met Mr. Jacobson, and in the local Childs Restaurant on 42nd Street, we discussed shells, the need for a local shell club and how to go about the formation of such a group. It was decided to try to obtain a meeting place at the American Museum and to post a notice there, also to post notices at the local college science departments and any other place that might contact shell people! The organizational meeting was called for Sunday, January 30, 1949, in Room 129 at the AMNH, 3 P.M. Nine persons answered the call, present were: Mr. & Mrs. Entwhistle, Mr. George Hubbell, Miss Joan Gordon, Mr. Morris Jacobson, Mr. Anthony D'Attilio, Mr. Fred Tobleman, Mr. George Jacobs, Dr. Walter Jacobs. Here are some of the minutes of that meeting: Mr. Jacobson was appointed acting President and Dr. Jacobs acting Secretary. It was agreed that the name of the organization should be the New York Shell Club. It was further agreed that a simple constitution be drawn up with provisions to include field trips for revising the list of New York Mollusca. Membership in the club is open to all interested in the subject. The program for the next meeting was to include a talk on radulae by Mr. Tobleman and on good collecting localities in New York by Mr. Jacobson. Mr. Tobleman brought an interesting Elliptio to show the group and Mr. D'Attilio showed an interesting shell from Japan. The meeting was adjourned at 4:30.

The second organization meeting of the New York Shell Club was held in Room 129 of the American Museum on Sunday, February 27, 1949. Present were: Mr. Morris K. Jacobson, Mr. Fred Tobleman, Mr. George Jacobs, Dr. Walter Jacobs, Mr. Mole, Mr. & Mrs. George Wilmott, Mr. & Mrs. D'Attilio, Mr. & Mrs. Entwhistle, Mr. & Mrs. LeMond, Miss Henrietta Schroeder, Mr. George Marks and Mr. Gundlach. These members and the group that were present at the first meeting were recognized as charter members of the club. The two acting officers were elected for the next year, with Mr. D'Attilio as the treasurer. Here is the financial report made at that meeting: Dues collected $13, disbursements for post cards $1.

And so the New York Shell Club was started.

THE BUSYCON WHELKS OF THE FLORIDA ICE AGE

by Allen Aigen

The busycon whelks of the Florida ice age tell a sinilar, but distinct story from the stromboid conchs which I wrote about for the September 1997 NY Shell Club Notes. The Busyconinae, a subfamily of the melongemids, is restricted to the east and Gulf coasts of North America. Although found in tropical waters, they are basically a paratropical or subtropical group. During the series of cold spells that culminated in the ice age glaciation, their diversity greatly increased, and then decreased in the Everglades basin where I collect. Please refer to the chart of time and rock units below.

Whelks are good subjects for considering problems in evolution and biogeography. They are fairly numerous (although as predators, less so than the stromboid conchs), large, usually well preserved, and with distinct features to characterize species. They are also a source of dispute in living specimens, with colonies characterized alternately as species, subspecies or local variants, depending on the author's prejudice. They lay eggs in strings of capsules that hatch out as miniatures. They spread slowly, therefore, and can be restricted to colonies by minor geographical barriers.

I had previously, conservatively, treated the genus Busycon Röding, 1798 as all-encompassing for the subfamily. Researching this paper, however, has convinced me that its currently accepted subgenera should be elevated to genera, as many researchers already have done (Hollister, 1958). These genera are consistently separate throughout geologic time, forming distinct monophyletic groups, separating but never crossing or mixing. There are accordingly six genera of busyconids that I will deal with, although there are earlier extinct genera not included in this study. The subfamily dates back to Cretaceous forms, some 100 million years ago.

Busycon (sensu strictu) is represented by the knobbed whelk, B. carica (Gmelin, 1791). I have this from the late Pleistocene Fort Thompson Formation, and it still occurs all along the east coast, to mid-Florida. This is typically a large, thick shell with knobs on rounded shoulders. Although represented in the Pliocene, this genus has not been found in the Caloosahatchee Formation. The controversial modern forms (e.g. B. eliceans) are apparently not represented in the areas where I have collected.

Busycotypus Wenz, 1943, is represented by many fossils, but older or from colder waters than the ones I collected. It is represented now by only one species, our club symbol B. canaliculatum (Linne,1758), the channeled whelk. This species ranges from Cape Cod to northeast Florida. Species of this genus are moderately large, with a generally scalariform spire and a square channeled suture.

Fulguropsis Marks, 1950, is like a small version of *Busycotypus*. The main difference, though, is the v-shaped sutural channels. The best known modern species is the pear whelk, *F. spiratum* (Lamarck, 1816) which occurs along the southeast and Gulf coasts. This species is also found throughout the Pleistocene in a few different forms.

Busycoarctum Hollister, 1958 is a moderately large genus with very long siphons, and non-channelled sutures. It is best known from the modern turnip whelk of the Yucatan, *B.coarctatum* (Sowerby, 1825). Petuch, 1988, considers this and two other uncommon Gulf species to have been evolved locally in a 'relict pocket' from similar Pliocene species that otherwise went totally extinct elsewhere. (Relict pockets in the Caribbean were the basis for Petuch's controversial 1987 book on new Caribbean faunas.) I have one Caloosahatchee species that does not closely resemble the local Pliocene species, and may have evolved from further north.

Pyruella Petuch, 1982, an extinct genus, is very similar to *Fulguropsis* but has little or no channeling. I have two species from the early Pleistocene, but there were at least six in the preceding Pliocene formations of Florida. It is not known past the early Pleistocene.

Echinofulgur Olsson and Harbison, 1953, is a very distinct genus with only one species known from the Pleistocene. *E.echinatum* (Dall, 1890), known only from the Caloosahatchee, with a subspecific form from the underlying Pliocene, is like a small *Busycon*, but with two rows of large spines on the body whorl. Since modern busyconids use their outer lip to pry open bivalves this genus may have swallowed prey whole. The spines may prevent lip breakage by crabs and make *echinatum* hard for large fish to swallow. Never very common, this genus is known from only two species, over a very long time span, probably due to missing (eroded) rock units.

Fulguropsis spiratum floridanum (Olsson and Harbison, 1953) is the Early Pleistocene form of the modern pear whelk, from the Caloosahatchee Formation. This subspecies can be distinguished from modern forms by its deeply excavated sutural canal. It is low-spired in maturity, commonly with weak spiral lirae outside and strong lirae inside. The shell varies from fairly thin to thick. Immature specimens vary widely in strength of the lirae and relative spire height, both of which generally decrease with maturity. I have one mature, very high-spired, narrow specimen, which may be an odd variant or a separate, rare subspecies.

Fulguropsis spiratum is separated into two modern subspecies. The east coast form, *F.s. pyruloides* (Say, 1822) is considered by Petuch to be a separate species. It is smoother and thinner-shelled than its Gulf coast equivalent, *F. spiratum* sensu strictu. The Gulf form also has strong lirae inside the aperture. The material I have from the Mid-Pleistocene Bermont Formation spans the gamut with relatively smooth shells, strongly lirate shells, thick and thin shells. But they all seem to be part of the same population, with most shells somewhere in the middle. Assuming that they were not already separate, non-interbreeding populations (sister species, which cannot be easily distinguished) the two subspecies probably split when the glacier lowered the sea level, effectively isolating the east and Gulf coast forms with land betwwwn, as it is today. Isolated small populations can be quickly dominated by one form or another, even if neither had a clear ecologic advantage, just due to luck favoring one group over the other, a process called genetic drift. Although large populations are subject to many conflicting forces that tend to produce stasis, genetic drift can change a small population in a few thousand generations or less. Geologically speaking, that is the blink of an eye.

We are left with the question of what to call the Bermont forms of this species. It is possible to try to place all specimens into either of the two modern subspecies. Then perhaps take the really different forms, like the small, nearly smooth forms that don't quite fit, and call them something new. But most of the submature specimens are a toss-up, and many of the mature ones also seem to be assignable either way. Perhaps we should call all but the oddest forms a new Bermont subspecies. But that will leave the problem of needing a large sample of the population to know which subspecies you have, which is not practical.

The large variability of a small population during times of stress has been documented for such diverse species as 500-million-year-old trilobites in western North America, and fresh water, ice-age snails in variable lakes in Africa (Williamson, 1982). This short-term variability leads to new species that then spread out and replace the previous species that did not survive the stress. This is how punctuated equilibrium works, alternating long periods of stasis with new species in a changed environment that seems to come from nowhere. Usually this variability is restricted to a shorter time frame, and is rarely documented. Perhaps the variable climate during the Bermont led to a retention of variety. Incidentally, the variable trlobite forms were left unnamed, but new snail forms were given new names. I will leave the Bermont forms as F. spiratum ssp? spiratum ssp?

Another distinct modern Fulguropsis species is F. plagosum (Conrad, 1863). Abbott, 1974, considers this to be an offshore subspecies of F. spiratum, which differs in retaining the angular shoulders and high spire of immaturity into the adult size. I do not know if it can be consistently distinguished in immature specimens, since they all look much alike when young.

There are also two other Texas forms, F. texanum and F. galvastonensis both (Hollister, 1958), which form distinct, high-spired colonies today. I consider them subspecies of F. plagosum.

The problem comes if all offshore forms are really separate, non-interbreeding species. Most modern monographs of, for instance, cones or miters lump the near-shore and offshore forms. Perhaps this is wrong. It is hard enough to distinguish live populations; fossils are more arbitrary, as they no longer can interbreed. Probably we will have to continue to decide on a case by case basis.

There is a Bermont species with angular shoulders that Petuch considers the probable ancestor of F. plagosum. F. feldmani (Petuch, 1991) is a deepwater species that apparently split off from F. spiratum in the short time between the end of the Caloosahatchee and the beginning of the Bermont, which is apparently represented by a gap in the record. It is a relatively small and low-spired. F. feldmani may well have died off without descendants, because it would be just as easy to derive F. plagosum from F. spiratum by retaining the immature characteristics into adulthood, a common process known as neoteny. It would require only about two changes in the genes.

Sinistrofulgur contrarium (Conrad, 1840) is a moderate-sized, narrow, usually moderately low-spired left-handed shell with a rounded to slightly angular shoulder. Olsson and Harbison, 1953, assigned this species to the modern lightning whelk, S. sinistrum (Hollister, 1958), since there is a colony of round-shouldered S. sinistrum, and individual small specimens may be difficult or impossible to assign with certainty. However, they are clearly distinct species. The large, heavy shell of a mature lightning whelk stands out in any upper Bermont or Fort Thompson deposit. They just do not occur in the Caloosahatchee Formation. (They may not occur in the lower Bermont, but stratigraphy is difficult when you are dealing with dredge piles.)

S. sinistrum is a rather variable species. I have specimens with flat spires and with elevated spires, shoulders round and smooth or sharp and knobby. I would have a good collection if I could handle a great many of the large specimens, but I would have to pay to ship them home!

There is a distinct form of S. contrarium found only in the lower Bermont, where it replaces the common Caloosahatchee form. Described as S. rosae (Petuch, 1991), it probably should have been called a subspecies, as Petuch did in 1988. It is very thick-shelled, with strong lirae inside and out. These characteristics are, of course, very variable for many species of this subfamily.

Pyruella, a common Pliocene genus, survived into the Caloosahatchee as only two species. P. planulatum (Dall, 1890) is a small, smooth, high-spired species with rounded shoulders and only a hint of a sutural canal. A very similar but larger, very variable species is P. eismonti (Petuch, 1991). It apparently evolved from P. planulatum late in the Calabrian. If so, it demonstrates that the suppression of a trait does not mean the elimination of it. Besides being larger (over 130 mm.), *P. eismonti* has strong to very faint lirae and is thicker-shelled with lirae on the outer lip. It also has a distinct knob in the posterior end of the inner lip when mature.

Busycoarctum rapum (Heilprin, 1887) frequently has a long, slender siphon that is usually broken, making it look like a *Pyruella* species. It is medium-sized and rounded, with slight knobs and a low spire. It apparently did not survive the cold at the end of the Calabrian as there are no Bermont species. As noted earlier, the modern species are likely to have been descended from small, relict colonies of Pliocene forms offshore in the Gulf of Mexico.

The busycon whelks are less appreciated here, where they are common, than elsewhere in the world. Perhaps now that you have a bit of their history, and an idea of the ways that they may have evolved, you may look at them in a new light. You may even try to appreciate the messy systematics of the group as being the result of the scientific struggle to understand this variable group. Many people, however, prefer simple, certain, stavle names, because then they don't have to change labels, and they feel sure of what they have.

LITERATURE (annotated)

Abbott, R.T. 1974. *American Seashells*. second edition. Van Nostrand Reinhold Co., NY 663 pp. 24 pls. (a conservative overview of the modern species)

Hollister, S.C. 1958. A review of the genus Busycon and its allies. Part 1. Palaeontographica Americana 4(28):1-124. (the major systematic revision)

Olsson, A.A. and Anne Harbison. 1953. *Pliocene Mollusca of Southern Florida*. 590 pp, 130 pls. 1990 reprint, Bailey Mathews Shell Museum, Sanibel, Florida. (basically Caloosahatchee shells).

Petuch, E. J. 1987. *New Caribbean Molluscan Faunas*. The Coastal Education and Research Foundation, Charlottesville, Virginia. 154 pp. (biogeography challenges status quo; sysyematics weak and widely criticized)

Petuch, E.J. 1988. *Neogene History of Tropical American Mollusks:* Biogeography and Evolutionary Patterns of Tropical Western Atlantic Mollusca. The Coastal Education and Research Foundation, Charlottesville, Virginia, 217 pp. (valuable overview in spite of problems with details of systematics)

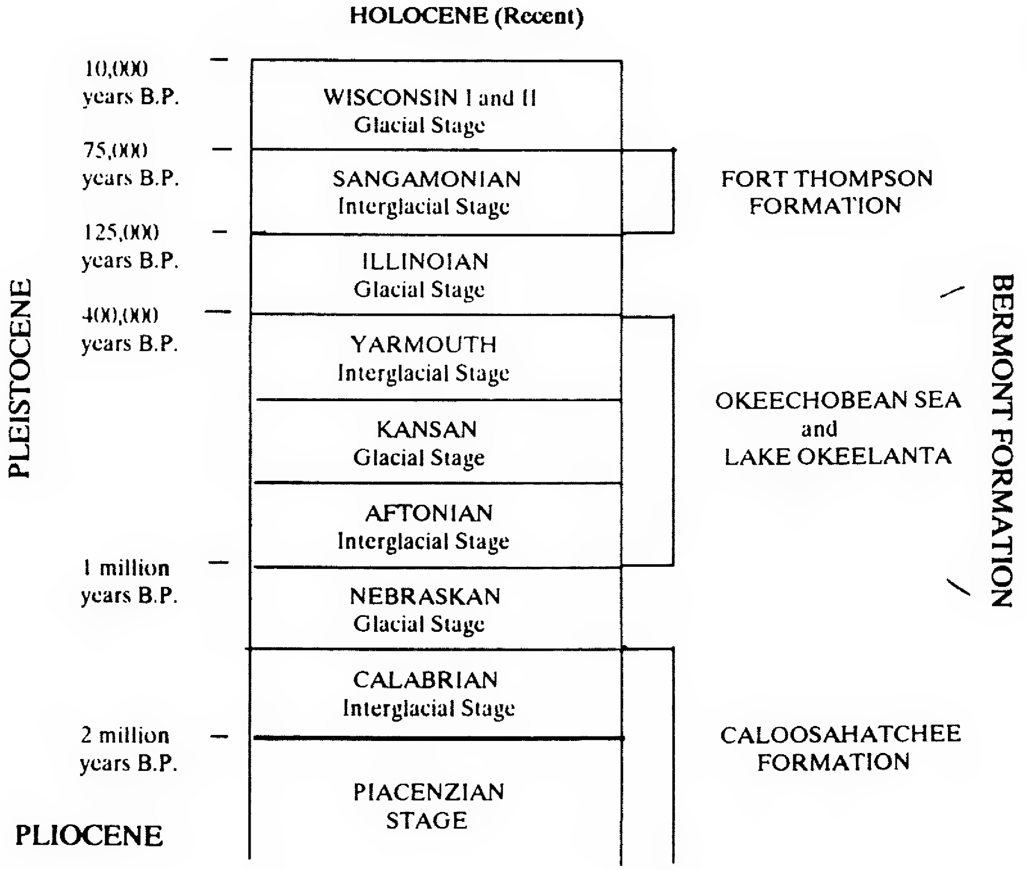
Petuch, E. J. 1991. New Gastropods from the Plio-Pleistocene of Southwestern Florida and the Everglades Basin. Special Publication no. 1, W. H. Dall Paleontological Research Center, Florida Atlantic University, 96 pp. (mostly uncommon shells, from a wide variety of places and times)

Petuch, E. J. 1992. *The Edge of the Fossil Sea.* Publication No. 2, Bailey-Mathews Shell Museum, Sanibel, Florida. (written as an overview of the Bermont; very readable)

Williamson, P. G. 1982. Paleontological documentation of speciation in Cenozoic molluscs from Turkana Basin in *Evolution Now--a century after Darwin*. J. M. Smith, ed. W. H. Freeman and Company, San Francisco, 239 pp. (technical but worth reading)

THE EDGE OF THE FOSSIL SEA

Pleistocene time line, showing the American glacial and interglacial stages and southern Floridian geological formations. (B.P. = before present time)



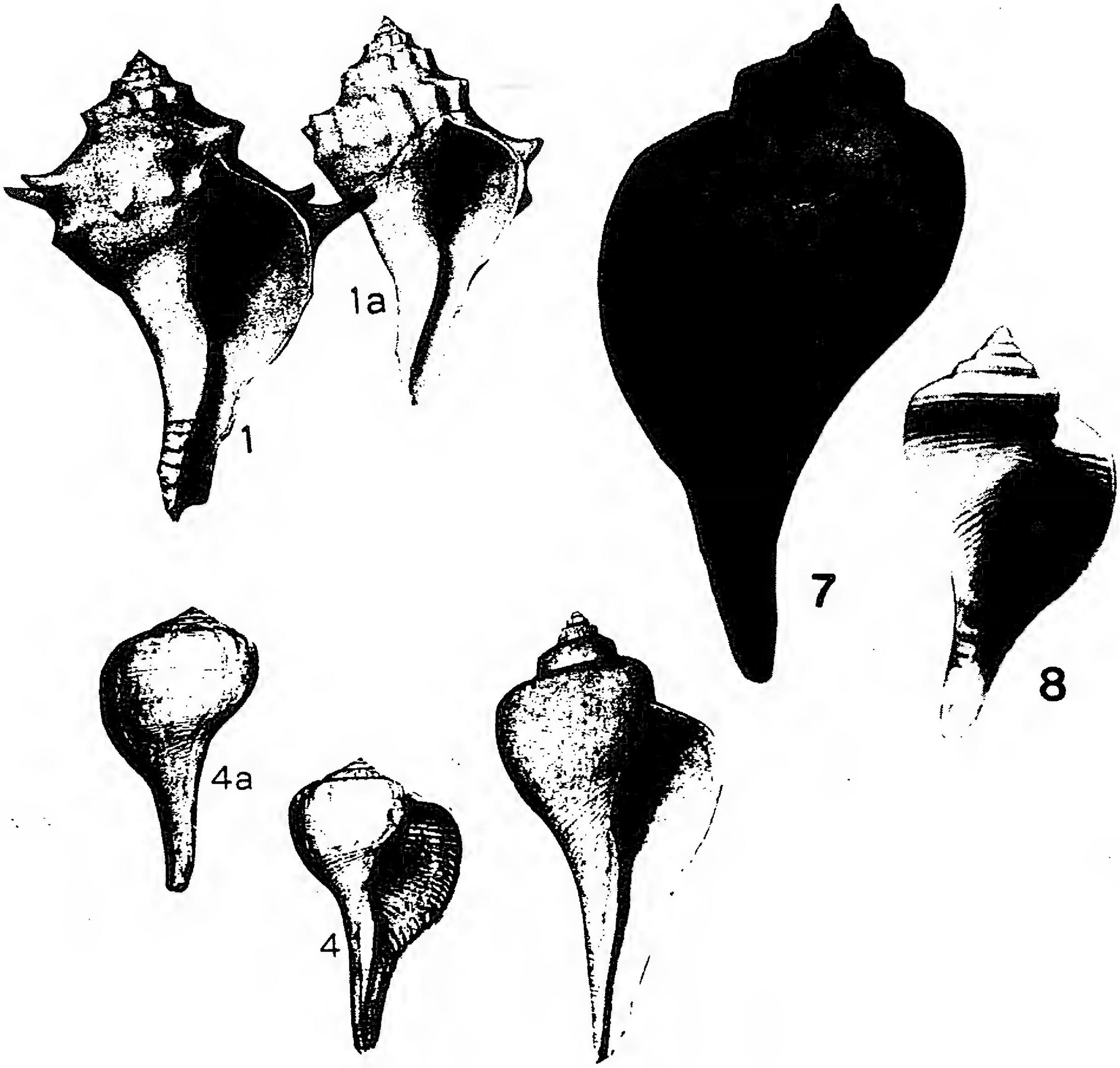


Plate 1. *Echinofulgur, Busycoarctum and Pyruella* species, Caloosahatchee Formation.
From: Olsson and Harbison, 1953, and Petuch, 1991.
figs. 1, 1a. *Echinofulgur echinatum,* 65 and 37 mm.
fig. 4.4a. *Busycoarctum rapum,* 70 mm. Note siphon broken short.
figs.7, 8. *Pyruella eismonti,* 134 and 83 mm.
fig. 9. *Pyruella planulatum,* 66 mm

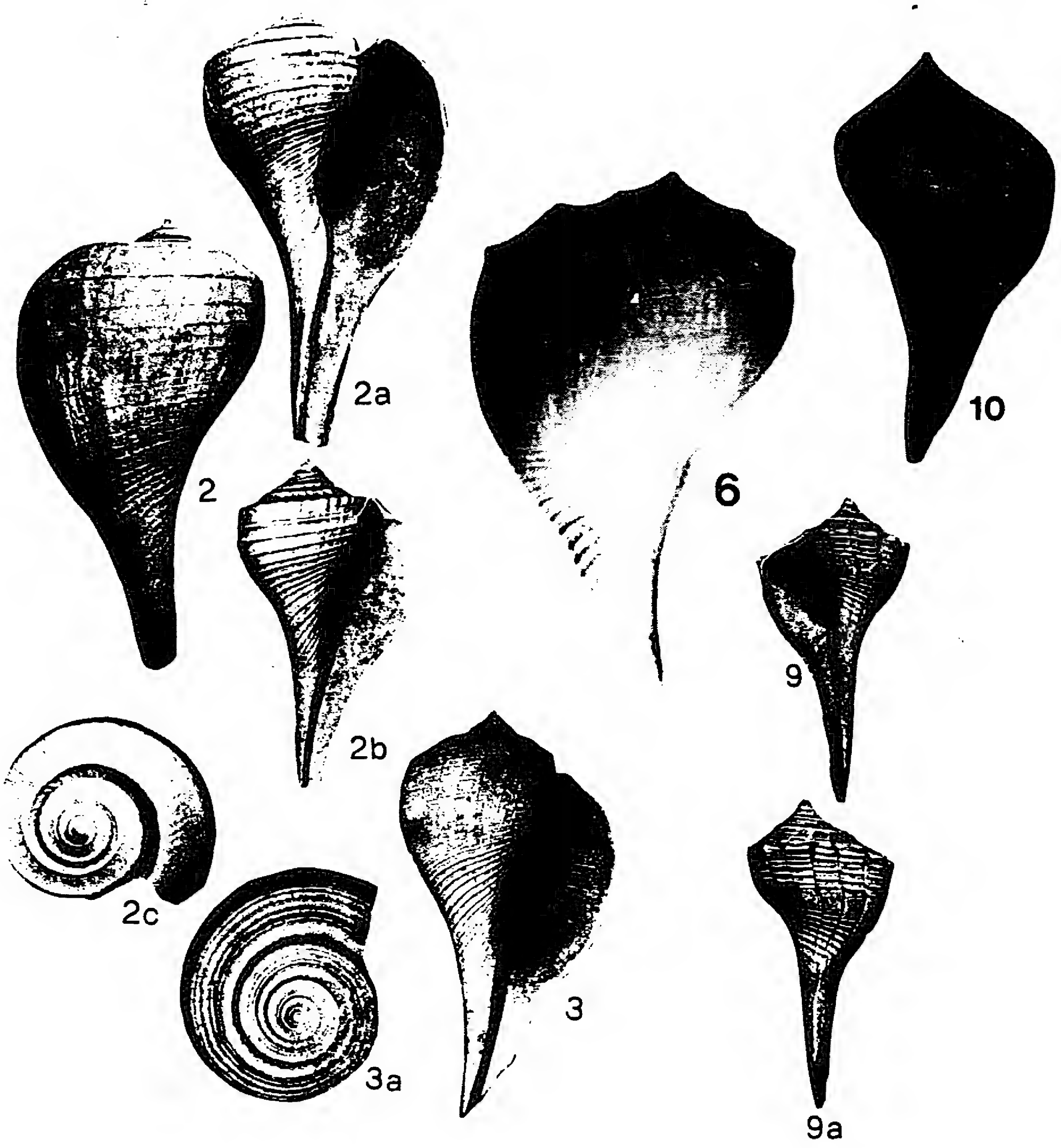


Plate 2. *Fulguropsis* and *Sinistrofulgur* species, Caloosahatchee Fm.(C), Bermont Fm.(B) and Modern (M). From: Olsson and Harbison, 1953, and Petuch, 1991.
figs. 2, 2a, 2b, 2c. *Fuguropsis spiratum floridanum*, (C), 56, 35 and 28 mm.
figs. 3, 3a. *Fulguropsis spiratum pyruloides*, (M), 79 mm.
fig.6. *Fulguropsis feldmani*, (B), 57 mm.
fig. 9, 9a. *Sinistrofulgur contrarium*, (C), 39 mm.
fig.10. *Sinistrofulgur roseae*, (B), 70 mm.

NEW YORK SHELL CLUB INC.

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New York, NY 10025

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Please note the place of each meeting, as well as the date.

PROGRAM SCHEDULE

SUNDAY, March 8, 1998	2:00 PM	THE UNDERWATER IMAGE David Doubilet Linder Theater
SUNDAY, April 5, 1998	1:00 PM	ANNUAL NYSC SOCIAL AND AUCTION Details, with auction list and location will be mailed about the end of March
SUNDAY, May 10, 1998	2:00 PM	SHELLING IN FIJI Steve Titelback
SUNDAY, June 14, 1998	2:00 PM	ANNUAL MEETING: Election of Officers and Directors for 1998-9

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HIGHLIGHTS OF RECENT MEETINGS

December 14, 1997. President Carl Ehrlich noted the death of Leonard Hill, the internationally known malacologist and shell dealer.

Romuald Czepulkowski commented on a group of turrids that he displayed. They had been collected by a Russian trawler. They were Antiplanes obliquiplicata from the Kurile Islands, at a depth of 2,500 meters: Ptychosyvinx truncata, Indian Ocean, 700 m.; Comitas onokeana vivens, Zanzibar, 700 m., and C. of laura, Indian Ocean, 790-800 m. Carl drew attention to several fossil shells and a Conus gloriamaris also on display.

The speaker was Paula Mikkelsen of the American Museum, whose subject was a species known as the yoyo clam and its four recently named genus-mates. These delicate shells are about 1 cm. in length and smaller. The shells are internal in the two largest species. The family is Galeomatidae, the genus is Divariscintilla, and the species Paula worked with is yoyo.

While working at the Harbor Branch Oceanographic Institute at Fort Pierce, Florida, on the Indian River, she was given live specimens collected on the flats. They were attached to mantis shrimp that others were collecting. They also attach to Cyrtopleura costata. The yoyos, shrimp and certain snails live commensurally in two-ended burrows, and the scientists collecting shrimp brought up whatever was in the burrows using a hand-powered auction device called a yabby.

Paula showed scanning electron microscope photos of the shell layers of the vitrinellid snails, along with diagrams and dyed sections of their anatomy. She explained how the movement of food through their digestive tracts is studied in anesthetized snails. She also showed diagrams and SEM pictures of the yoyos and their fellow-species. Turning to the television set, she showed how the yoyo got its name. They attach themselves to solid objects with a byssus, and the camera caught one that had chosen the wall of its tank. Dangling at the end of its short byssus, it suddenly retracted the thread, giving itself a little rocket ride. This was followed by a slow descent and a silent count-down to the next lift-off.

The door prizes were Alcithoe arabica, Haustrum haustorium and Strombus laciniatus.

January 11, 1998. The January meeting was a swap session, an opportunity that inspired a strong turnout of both members and and shells, The array of specimens was excellent and the swapping was fast and furious. It's safe to say that all the trades resulted in improved collections.

It was pointed out that our April meeting date coincides, this year, with Easter Sunday. This, it was decided, is sufficient reason to alter our meeting schedule, especially since the April meeting consists of the annual auction. It was voted to move the date up a week, to April 5, 1998

The material that will go under the hammer at the annual auction will offer unusual opportunities for those interested in shell literature. The core of the selections will include books and papers from the library of Dorothy and George Haeihle. The offerings of shells will again feature a fine array of volutes from the Kayman collection. Your contribution(s) will be welcome!

WE NEED A LITTLE LIST, SO NO ONE WILL BE MISSED

It's been too long since we brought our membership list up to date, so we will put one together and publish copies in the near future. Making it cutting-edge and state-of-the-art will require your help. To wit: if your address, (name) or phone number (or alias) has changed and you haven't notified Theta, please do so. If we have your phone number and you don't want it listed, please indicate. Send corrections ASAP to our Treasurer-Membership, Theta Lourbacos, 66 West 94 Street, Apt. 20C, New York, N.Y.10025.

February 8, 1998. On display was a group of Murex that Carl Ehrlich had collected on a recent trip to Panama. The door prizes were Thais orbita, won by Paula Mikkelsen; Morum tuberculosum, won by Gary Rosenberg, and Conus canonicus, won by Irv Hoppenwasser.

Paula introduced Chris Boyko and Jay Cordero, both on the staff of the American Museum's mollusk department. Jay cam aboard recently as Collections Manager.

The speaker was Gary Rosenberg, of the Philadelphia Academy of Natural Sciences. His subject wasColor in Shells, and the hypotheses concerning its role in success and survival. There are no universal theories, because what seems like a reasonable assumption in one group of mollusks is almost surely contradicted in another. The value of color as camouflage, for example, seems certain in many groups, but others show colors and patterns that make them conspicuous. On the other hand, a vivid visual impact may carry the warning "I'm poisonous." Variability within a species may prevent predators from forming search patterns. And what of those flamboyant eyefuls that in life are covered with a drab periostracum? Where colors are always visible, ~~can~~ they play a role in recognition and communication in a phylum in which colorblidness is almost universal? There is also a theory that pigments in shells make them stronger.

Among the certainties are that environment - water chemistry, for example - and diet affect color. There is reason to believe that diet affects shell formation, too. Some species that live in surf develop knobs, while the same species living in calm water do not. The algae that the rock-scrapers live on are different in these two environments.

Gary ended by noting that copies of his 1992 "Encyclopedia of Seashells" are still available from the Academy. Orders for ten or more copies of $29 book will be filled at $10 per copy.

(As an interesting comment on the foregoing,
we reprint the following from JUNONIA of
March, 1995, Sanibel-Captive, S.C.)

COLORATION IN MOLLUSKS

Shell color resides in an oil base. It is deposited by the mantle with the shell material. How does the mollusk's mantle "remember" the intricate designs it creates? Malacologists do not know. Sometimes an injury will make it "forget" and the results are interesting. One cowrie which normally would have had a plain brown band around the base of its shell "forgot" to combine the right ingredients on one side. Result: a Chinese red blotch on one side of an otherwise normal shell.

That food may cause different shell colors in some species has been proven experimentally. The carnivorous snail Thais lapillus, found along the coast of New England, is usually gray or white. The gray ones are commonest where the mussels are abundant on the rocks, the white ones where barnacles are the chief food source. White shells, forced to feed exclusively on mussels, produce new shell growth that is gray. Conversely, gray ones on a diet of barnacles produce white shells. However, such feeding experiments have failed to explain the little orange-colored Thais lapillus found in both white and gray colonies.

(Another comment; reprinted from
Central Florida Shell News, Feb. 1998)

MALE VERSUS FEMALE DYES

In the HSN, August 1991, p. 4, Tom Burch wrote an article, "Royal Purple and Talmudic Blue." He mentioned that the Trunculariopsis trunculus (Hexaplex trunculus?), Murex brandaris and Thais haemastoma have a gland on the mantle that excretes a clear fluid that is the "precursor" of the Tyrian purple and Talmudic blue dues. "There is considerable variation in the color obtained from the mollusks.

Even the sexes yield different colors: male T. trunculus secretes a liquid that yields indigo, but the secretion from the female leads to the brominated (combined with bromine) purple dye." Do they eat different foods?

COMING ATTRACTIONS

"The Underwater Image" March 8, 1998, David Doubilet

2 PM, Linder Theater, American Museum of Natural History

David Doubilet, one of the world's leading underwater photographers and an accomplished professional speaker, will treat the New York Shell Club to an illustrated lecture on "The Underwater Image". Doubilet, a New Jersey native, began snorkeling at age 8 and has been working as a contract photographer for for National Geographic for the past twenty-five years. He has written four books and photographed almost 50 articles for National Geographic, including nine covers, since 1972. His work has won numerous prizes and taken him throughout the world, his favorite area being the Red Sea.

The meeting is expected to be the highlight of the Club's program year. We expect a large turnout, so the audience is advised to arrive promptly.

Sunday, April 5, 1998. NEW YORK SHELL CLUB ANNUAL SOCIAL & AUCTION

This will be held at Dorothy Jensen's Broadway Dance Studio, 31-08 Broadway, Astoria, Queens. We welcome donations of specimen shells, shell books, and shell-related items, to enhance the interesting selections we now have on hand.

Your attendance and donations are most appreciated because funds raised from the auction cover the cost of our routine operations, and printing our quarterly NYSC NOTES.

Also, we need help in providing refreshments, as well as assistance before and during the auction. As in past years, a list of auction items will be mailed to local members and friends about the end of March.

PUBLICATION NOW AVAILABLE

The 21st edition (1997-1998) of Tom Rice's A Sheller's Directory of Clubs, Books, Periodicals and Dealers is now available. This 112 page, 8½x11 inch format, spiral-bound publication can be ordered direct from the publisher, (Of Sea & Shore Publications), P.O. Box 219, Port Gamble, WA 98364. Cost is $4.95 plus $1.50 postage (Book Rate) or $3.00 (First Class).

LARVAE AWAY MY BOYS!
THE BAFFLING BOAT SHELL

by DAVE GRANT

reprinted from UNDERWATER NATURALIST, Vol. 20, No. 4

On July 21st an associate, Tore Knower, and I decided to go diving... Diving from the shore in New Jersey in the summer provides few options for clean water because of wave turbulence, turbidity in the rivers after rain storms, and plankton blooms, but one site along the New Jersey coast that is an exception to the rule is Shark River Inlet.

Shark River, so called for the fossil shark teeth commonly found upstream in its freshwater source, receives relatively small amounts of fresh water from its drainage system. The result is an estuary of fairly clean, high salinity ocean water that sloshes back and forth with the tides through its inlet. It also may harbor the richest variety of marinelife in any New Jersey estuary. At high tide it is possible to find conditions that rival the offshore waters, so the inlet is a popular place. The currents are strong; the best diving conditions are close to slack water when there is less swimming against the tide, higher water levels, and fewer slippery jetty rocks to scramble across to get to the water.

Diving here is restricted to after 5:30 P.M. assuring divers of sharing the inlet with as large a crowd as possible of fishermen, party boats, and other divers on the three or four days a month when the high tide slack occurs in the late afternoon and the sun is still high. There is sometimes almost a festive air as the divers enter the water, and more than one fisherman has masked his enthusiasm for us by shaking clenched fists and casting lures close by. The river swarms with fishes and other marine life, but there are still people who are convinced that divers scare all the fish away.

Our quest this day was not to catch fish, or snatcha lobster which are common in these cool waters, but simply to enjoy the sights and escape the heat. The water temperature was 65° F. and a low visibility (three feet) meant this was to be a "macro" dive--that is, we would scour the rocks for close-up looks at invertebrates rather than look at fish. We entered the water under the bridge away from the many fishermen on the jetties. Soon our attention was drawn to a good-sized, two inch boat shell clinging to one of the few bare patches of rock.

Typically boat shells are common sub-tidally, and this specimen was about three feet below the low tide mark. Generally they are so securely attached to the substrate that, like West Coast abalones, they can only be pried off with a tool. This shell was atypically propped up at a slight angle. Mucus was streaming from it and waving rhythmically with the motion created by the boat wakes slapping against the rocks above us.

Observation of this boat shell might answer a nagging question or two about the feeding habits of this almost immobile member of the snail family. Logic would dictate that these are filter feeders of some sort because they are so inactive, but their snail-like structures and prominent mouths indicate that they must graze off the substrate where they are attached. However, a close examination of this boat shell's behavior revealed it was not feeding, but releasing its young.

Boat shells come in a variety of shapes and colors. They can be as white and flat as oysters or as colorful and almost as rounded as tropical snails....Since it is one of the oddest of all shells I am always on the look out for more information about it.

Three species of boat shells are found along our coast. The largest, which can grow up to two inches in length, is the common or Crepidula fornicata. The smallest or C. convexa is just a quarter of that size. Both are brilliantly colored compared to their pale, flat cousin, the slipper shell. The common boat shell, the one we were observing, is the most abundant of the three which wash up on the beaches and exhibits the most individual variation.

The boat shell is so named because of its shape which resembles the str the structure of a boat. The pointed "bow" half of the aperture is covered with a partition called a diaphragm that could be the forecastle of a ship. The "stern" of the shell is appropriatly rounded.

* * * * * * * * *

This is a flattened mollusk that seldom moves from the rock or piling where it settled out from its larval stage. Although it reluctantly and sluggishly moves about if compelled to do so, its shell tends to grow to fit the shape of the substrate it is on. It frequently grows on the underside of horseshoe crabs and makes such a perfect seal with its shell that people often think it a part of the crab.

Boar shells are generally found in clumps of a half-dozen or more; the largest are the females securing the cluster to the substrate. Successive generations of planktonic youngsters are chemically attracted to settle on top of the females where they are stimulated to develop into males. The young are particularly well endowed for this task. One male can move around fertilizing a cluster of females. His carefree life as a satyr is temporary however. As he grows large enough to produce eggs, another youngster settles out of the plankton on his back, and he loses his reproductive organ and develops into a female.

Females can produce up to 5,000 eggs at a time and appear to have an extended spawning period. I've peeled females off horseshoe crabs and found eggs in May, June, and July. The eggs, which are golden when they are first laid, are secured to the substrate under the female's foot. There she "incubates" them until they hatch into whitish larvae, each the size of the period at the end of this sentence.

This was the stage we observed during our dive. Each time the female lifted the front of her shell, about two dozen larvae bathed in a thin layer of mucus were released. (I discovered later that mucum is also used to entangle food particles on the boat snail's gill filaments.) The larvae releasing process took about 20 minutes and in the case of this particular shell, coincided with the beginning of the outgoing tide. We looked for other boat shells to see if there was synchronization among other spawners, but since I was now almost out of air and the current was increasing, we were not successful in our search.

Boat shells have some direct importance to humans in that they are edible. In Europe, where they emigrated with transplanted American oysters, they were eaten during World War II when other seafood was scarce. New Englanders tell me that "people down on the Chesapeake eat them just like oysters." Donald Zinn (HANDBOOK FOR BEACH-STROLLERS) recommends them "raw" but I've yet to meet a Virginian who admits to even trying one. Since boat shells compete for the same food as the native oysters that have been crowded out in some places where they have been introduced, they may be a logical alternative for the menu. But since our local waters are condemned to shellfishing, and I am not a big aficionado of raw oysters, I haven't been tempted to try one.

A 'DEAD ZONE' GROWS IN THE GULF OF MEXICO

by Carol Kaesuk Yoon

from THE NEW YORK TIMES, January 20, 1998, p.F1

It can stretch for 7,000 square miles off the coast of Louisiana, a vast expanse of ocean devoid of the region's usual rich bounty of fish and shrimp, its bottom littered with the remains of crabs and worms unable to flee its suffocating grasp. This is the Gulf of Mexico's "dead zone," which last summer reached the size of the state of New Jersey.

(The above paragraph begins a long article describing the beginning of the first large-scale study of the area. 1998 has been marked as the international Year of the Ocean.)

SHELLS ARE WHERE YOU FIND THEM - LOST SPECIES REDISCOVERED

(reprinted from SHELL-O-GRAM, Jacksonville Shell Club, 1998)

About a year and a half ago, Mr. Russ Webb (Vice-President of the Oregon Shell Club) and his wife Sue, made a collecting trip to Fiji. During the trip while SCUBA diving at a depth of 45 feet, the Webbs collected a colorful 61 mm. specimen of Cymatium on the top of a coral reef drop-off (wall) in rubble.

In the ensuing period, the identity of this specimen had proven elusi elusive, so Mr. Webb wrote an article for the December issue of his club newsletter, accompanied by a color photograph, soliciting identification assistance. The article was concurrently published in the Internet edition of *Hawaiian Shell News*.

Your Editor, Assistant Editor, and author* Betty Jean Piech of Wilmington, Delaware, immediately recognized the unidentified specimen as the very rare Cymatium (Ranularia) armatum (Sowerby, 1897).

According to Betty Jean, prior to Mr. Webb's recent find, only six specimens and a fragment were known to the scientific community. Both your Assistant Editor and Betty Jean, believe that this is probably the first live-collected specimen and the first specimen with reliable locality data.

In congratulatory correspondence to Mr. Webb, Mrs. Piech recalled a story told to her by the late R. Tucker Abbott who reflected on a trip in the South Pacific and finding a shell that he really wanted. Dr. Abbott turned around to show it off to his fellow collectors-- but no one was in shouting distance. So he said he just raised the shell in the air, looked up at the sky and shouted, "Look God, look what I just found!" Your C.armatum certainly warranted that type of reaction.

Your Assistant Editor pointed out that it took exactly a century to document a living C. armatum after its first disclosure to science.

*Piech, Betty Jean 1995. *Ranellidae And Personidae: A Classification of Recent Species*, Delaware Museum of Natural History, Wilmington, DE. 60 pp.

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Information on field trips or changes in meeting dates will be provided as required.

PROGRAM SCHEDULE

SUNDAY, June 14, 1998	2:00 PM	ANNUAL MEETING: Election of Officers and Directors for 1998-9 Dr. David Robinson Academy of Natural Sciences, Philadelphia "Alien Invasions"

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HIGHLIGHTS OF RECENT MEETINGS

March 8, 1998. The 460th meeting of the New York Shell Club was a special one, consisting of a presentation of slide photographs by the world-famous underwater photographer, David Doubilet. Because the meeting was open to the general public, it was held in the Linder Theater of the American Museum of Natural History. Attendance was about 60.

President Carl Ehrlich opened the informal meeting by introducing the speaker. Following additional comments by Mel Springer, Mr. Doubilet opened by sketching the events and circumstances that led him to his staff position at the National Geographic magazine and world-wide recognition.

The photos he had selected were a world tour underwater, with appropriate air and scenic views. Among the locales were the Caribbean, Japan, Indonesia and Australia. His subjects included coral, fish, Nautilus, nudibranchs, eels, squid, octopus and crabs, plus some World War II ship and aircraft wrecks, and microphotographs of plankton. With special equipment of his own creation he made pictures of underwater scenes combined with their nearby terra firma backgrounds. Colors, compositions and the moods of the skies elevate these to their own level of artistry. Corals seen in ultraviolet light are another surprise.

The hot subject of the Question-and-answer period that followed the presentation was conservation. Mr. Doubilet sees overfishing as the greatest present danger to the marine environment. He feels that tourism programs could bring cash to remote populations that now subsist by overfishing, which is especially damaging when done on the reefs. To his audience he made two pleas: "Don't touch the coral!" and "Don't eat swordfish!"

April 5, 1998. The program of the 461st meeting of the New York Shell Club was the annual auction, held at Dorothy Jensen's Broadway Dance Studio in Astoria, Queens.

Auctioneer Mel Springer, assisted by Carl Ehrlich and Romuald Czepulkowski, opened the bidding on the first of about 150 items at 1:00 p.m. Books were especially heavily represented, the majority having come from the library of George and Dorothy Raeihle.

The bidding was at its most competitive for these shells:

Plicoliva zelindae - $210
Cypraea aurantium - $130
Conus cedonulli - $70
Pleuroploca gigantea 1) 34 mm. 2) 18" - $60
Conus bertarollae - $50
Conus sanderi - $50

Calliostoma benedicti - $40
Conus textilis (melanistic) - $40
Chicoreus saulae - $35
Voluta ebraea - $35

Many of the day's offerings went at bargain prices, and Mel was moved to call at least three of them "steals"; the Plicoliva at the top of the list, two Ericusa sericata at $5 and Cypraea comptoni, form alabata, at $5.

The raffle prizes were Vasum crassiformis and an imposing Cassis cornuta.

Heaping bargain and sale tables were unheaped rapidly, as was the snack table.

May 10, 1998. In the absence of the president and vice-president, the recording secretary opened the meeting, reporting that President Carl Ehrlich was recovering from a fall in which he had broken two ribs.

The speaker was Dr. Stephen Tettelbach, associate professor of marine science and biology in the Natural Science Division of Southampton College, Long Island University. He is a member of the Long Island Shell Club.

Steve teaches coral reef ecology by taking small classes of students on month-long trips to places like Fiji, Tonga, New Caledonia, the Solomons and the Cook Islands. The many slide photos he showed and commented on included air views, scenery and such underwater denizens as mollusks, fish, sea stars and hermit crabs. Steve is an excellent photographer and his pictures were beautiful and instructive. At several stops the group did some intensive shelling, wading, SCUBA diving, with excellent results. A lengthy question and answer period followed his presentation.

The door prizes were Haustrum haustorium, won by Lisa Tettelbach; Ericusa sowerbyi, won by Al Scarpetti, and Neothais orbita, won by Irv Hoppenwasser.

COMING ATTRACTIONS

On Friday, June 26, 6:30 p.m. at the American Museum of Natural History. Program code MM2-6

Few works of nature can match the beauty of shells. Join beachcomber "Bob" Campanile as he takes to the shore to explore the amazing creatures that produce the sea shells we hunt in the summer. The excursion will also include a trip through several of the Museum's halls to discover how different cultures have used shells in their art and daily life.

YOUR HALL OF HALLS - The American Museum of Natural History will open its Hall of Biodiversity, a new 11,000-square-foot, $17.8 million permanent exhibit celebrating the interdependency of life on Earth. * This was some undertaking. To build a huge diorama of a rain forest, 500,000 plastic leaves, representing 61 different species, were cut--including 5,000 snipped by the pudgy hands of 25,000 school kids. * Sixty species of arthropods are represented, including millipedes whose every leg was trimmed by hand. * Part of the message, of course, is that the rain forests are under siege, so the diorama is split into pristine and degraded sections. * In case you're wondering: no animals were harmed to make it possible. * The body hair on the Emperor moths, for instance, was made from recycled scrap fur.

from the NEW YORK TIMES, Sunday, May 24, 1998

PREVIEW OF NYSC FALL PROGRAMS

Saturday, October 10, 1998, with the Long Island Shell Club

BEHIND THE SCENES AT THE AQUARIUM - 10:00 A.M.

The group will assemble at the Aquarium. Details will be provided in the September issue of NYSC NOTES.

Saturday, November 7, 1998

Trip to the PHILADELPHIA SHELL SHOW,

Information on show and bus transportation will be provided in the September issue of NYSC NOTES.

Sunday, December 13, 1998

"Grunge Party" in our usual meeting room at the Museum; details in the September NYSC NOTES.

NEW LAWS TO REMEMBER BEFORE COLLECTING IN THE FLORIDA KEYS

By Helen Kwiat - from info
in Marine Conservation News

If you have a future shelling trip planned for the Keys, you better familiarize yourself with the new rules limiting activities in this area that took effect on July 1st.

Most of us were aware that in November of 1990, plans were made to protect a good 20% of the continental shelf (about 3,674 square miles) off the Florida Keys and was thus named the Florida Keys National Marine Sanctuary. The area was to be managed by the National Oceanographic and Atmospheric Administration (NOAA) as joint venture with the Florida Department of Environmental Protection. On Sept. 24, 1996, a long awaited "Final" Management Plan for the Florida Keys National Marine Sanctuary (FKNMS) was released. It detailed that there would be 1 not 3 "no take" zones which only took up 15 of the 2800 square miles in the sanctuary. This area is called the Sambos Ecological Reserve which is directly off Boca Chica Key.

The "Final Plan" also included lists of protected areas in the sanctuary that would have strict laws prohibiting many of the activities that we shell collectors enjoy. After a series of hearings, revised new rules were accepted and were to be implemented as of July 1st. Four types of zones were designed to include 18 sanctuary preservation areas, one ecological reserve in Western Sambos, 4 special-use areas for research only, and 27 wildlife management areas. These areas were in addition to the preexisting parks and refuges set up from the 60's through 80's.

Many of the rules in the plan are quite long and complex, but there are some straight forward rules in regard to shell collecting.

1. Ecological Reserve - entry is allowed but removal of any marine life is prohibited (shell collecting specifically mentioned - includes dead shells).

2. Sanctuary Preservation Areas - entry is allowed but removal of any marine life is prohibited (shell collecting again specifically mentioned - includes dead shells).

3. Special-Use Areas - no entry is allowed without a valid research permit.

4. Wildlife Management Areas - twenty of the twenty-seven fall under the jurisdiction of the U.S. Fish and Wildlife Service. No specific new rules in regard to shell collecting.

5. Existing Management Areas - no specific new rules for these areas in regard to harvest.

Further information is available from the Florida Keys National Marine Sanctuary, P.O. Box 500368, Marathon, FL 33050. Telephone (305) 743-2437. E-mail to their center at fknmms@ocean.nos.noaa.gov. or on the internet at HTTP://www.fknms.nos.noaa.gov/

For those of us who have been collecting on many of the reefs in the Keys, you will find some of your best collecting areas now protected in the Sanctuary Preservation Areas. I'm relieved to find one of my favorite areas, Pickles Reef, was not established as a "no shell collecting" area. But I'm sure that will change soon. This is the reason why the shelling community must step up and become lovers and guardians of their hobby. I realize that most of the Florida Keys problems have come from big-time development! "My Keys" will never return, no matter what Sanctuary Preservation Areas are set up. But it mostly saddens me to see that we "shellers" will carry the brunt of the punishment, and will have to wait for several generations before possibly ever being able to pick up dead or live shells there again. What happened in the Keys will most certainly happen elsewhere.

We must become informed of the proposed plans before they become laws. And even after such plans take effect, we must continue to provide evidence to protect our hobby, if not for yourselves, but for further generations. If you would like to know what's happening, write for a copy of the quarterly magazine, Marine Conservation News, Center for Marine Conservation, 1725 Desales Street NW, Washington, DC, 20036.

(from Central Florida Shell News, Aug. 1997)

EXOSKELETONS IN THE FAMILY CLOSET

Mergenthaler Winotype

We live and curate in a time when it's a wise species that knows its own genus. So, if you write labels without checking the latest revisions, go sit with the unwise species. Of course, genus-gutting is hardly new, but these days the meticulous collector/curator may be justified in hollering, "Stop the whorl - I'm flying off!"

Given today's permissive, indulgent attitude toward scientific progress, one marvels that there has been no matching orgy of family-filleting. It's a puzzlement, especially since it was pointed out over 20 years ago that naming new families could be amusing - a romp for the imagination. But perhaps the present concern over family values has imposed caution even on malacologists who regard the genus as fair game.

Assuming, then, that the family will stand firm while the genus totters, it should do no harm to hear again the siren-song yodeled those many years ago in the Conchologists of America Bulletin No. 6:

The Family: product of paternity and maternity, consequence of consanguinity, wellspring of posterity, foundation of continuity, receptacle of heredity, repository of affinity, similarity, uniformity - yet font of variety. And, properly abused, source of some mild hilarity, maybe.

To wit: Suppose, with your collecting expertise, you discover a new species. It fits, beyond quibble, into an existing genus. But your brilliant research throws new light on the genus, and you realize that it should go into a new family. So you erect the new family, and maybe a subfamily, and you name them ... what?

Don't panic. Sometimes a name sort of suggests itself, as in the recent instances, guaranteed genuine and authentic, listed below.

(By an astonishing concatenation of coincidence, all of the "new" specific names were already in the literature, associated with one or more other genera.) Be the first savant on your block to scribble these revisions in the margins of your musty old reference tomes.

GENUS and NEW SPECIES & SUBSPECIES	NEW FAMILY	NEW SUBFAMILY
Gastropoda		
Melampus bulbus	Electricidae	
Arabica tenta plicata	Mobilidae	
Gaza telescopium periscopiana	Curiosidae	Scrutinae
Lunatia clara	Debussidae	Euphinae
Caecum arestrum	Necessidae	
Cassis clayi pugilis	Loquacidae	
Fenimorea cooperi	Prolixidae	Monotinae
Conus chocolatus flavus	Hitziggidae	
Neverita candei deliciosa	Austeridae	
Depressiscala ponderosa bigemma	Obesidae	Gluttinae
Siphonaria breweri	Satiidae	Germinae
Oliva martini	Thirsidae	
Bivalvia		
Tapes whitehousei	Duplicidae	Ignominae
Discors ziczac	Ambiguidae	
Carditella fortunei	Gullibilidae	
Cuspidaria brassica	Gentilidae	
Lopha lasius extraordinarius	Torpididae	
Musculus adonis	Virilidae	
Rangia ponderosa	Televisioncidae	
Freshwater Gastropoda		
Burnupia brazieri	Nonconformidae	
Pila sandwichensis cervus	Hospitalidae	
Stanleya neglecta anna	Perversidae	Misoginae
Cleopatra lurida histrio	Notoriidae	
Spekia vulgaris	Profanidae	

Freshwater Bivalvia

Sphaerium globosum	Rotundidae
Lampsilis filamentosus	Luminosidae

> "...thou better name / than all the family of fame!"
>
> *Ode to Tranquillidae*
>
> S. T. Coleridge

In fairness, it should be noted that these examples are selections from a longer list. A popular uprising could forestall the appearance of more of it in future issues, but the job would call for hounds, torches, pitchforks and a lot of yelling.

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A new book, *Coastal Paleoceanography of Eastern North America (Miocene - Pleistocene)* has been written by Edward Petuch. This book chronicles the Neogene period that comprised the Miocene, Pliocene and Pleistocene epochs and encompasses the past 23 million years - the most exciting and dynamic periods in the earth's history. The soft bond book has drawings by the author of shells, maps, photographs of areas, a 750 molluscan index of fossils and 70 plates. Chapter 5 restates his now out-of-print "Field Guide to Echporas" and Chapter 7 pertains to Coral Zonation and Ecology. The book is $59.95 plus $4.00 for shipping and may be ordered by calling Kendall-Hunt Publishing at 1-800-228-0810.

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These NOTES are issued four times annually and distributed by mail to all members of NEW YORK SHELL CLUB. Items and articles for publication in the NOTES should be sent to the Editor. A limited number of back issues of the NOTES are available, $2.00 per copy postpaid.

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Full Membership $12.00 per year
Full Family Membership $15.00 per year
Corresponding Membership $10.00 per year
Foreign Membership $12.00 per year, paid in U.S. currency

The Treasurer-Membership officer should be notified promptly of any change of address.

NEW YORK SHELL CLUB INC.

FOUNDED JAN. 1949

SCHEDULE OF MEETINGS

PLEASE NOTE: There may be differences in dates and/or places for meetings from those given below. Consult your current issue of NYSC NOTES for changes. The April meeting, our annual Social/Auction, will not be held at the Museum.

1997 - 1998

October 12, 1997
November 8, 1997
December 14, 1997
January 11, 1998
February 8, 1998
March 8, 1998
April 5, 1998
May 10, 1998
June 14, 1998

With the exception of this year's November and April meetings, (see NOTE below), meetings are held at the American Museum of Natural History, Central Park West at 79 Street, New York City, starting at 2 PM. Visitors are always welcome

On our meeting days, you may gain admission to the Museum without paying the Museum's admission fee by presenting your NEW YORK SHELL CLUB membership card.

Most of our meetings at the Museum will probably be in the Blum Classroom on the 1st floor near the 77th Street entrance to the Museum. As in the past two years, our November meeting is planned as a visit to the Philadelphia Shell Show on Saturday, November 8, probably a bus trip in conjunction with the Long Island Shell Club. Our April, 1998 meeting will be our annual Auction and Social, which is not held at the Museum.

NOTE: NEW YORK SHELL CLUB pins are available; $3.50 at a meeting.

Mail orders ($4.00 per pin) should be sent to:

Theta Lourbacos, NYSC
66 West 94 St., Apt. 20C
New York, NY 10025

The NEW YORK SHELL CLUB meets usually on the second Sunday of the month from October to June. Winter and Spring meetings are usually at the American Museum of Natural History, New York City. On meeting days your NYSC membership card will provide admission to the Museum without payment of the Museum's admission fee.

Information on field trips or changes in meeting dates will be provided as required.

PROGRAM SCHEDULE

Saturday, October 10, 1998	10:00 AM	NEW YORK AQUARIUM FIELD TRIP (see page 2)
Saturday, November 7, 1998	Field trip to the Philadelphia Shell Show	
Sunday, December 13, 1998	2:00 PM	American Museum of Natural History "Grunge Party"

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NEW YORK AQUARIUM FIELD TRIP

On Saturday, October 10, the New York Shell Club, in conjunction with the Long Island Shell Club, will sponsor a field trip to the New York Aquarium located in Brooklyn, N.Y. A guide will be provided for a fascinating behind-the-scenes tour. There is no charge to club members except for parking. In order to keep the number manageable, those desiring to go should reserve a place by calling Mel Springer, President of the Long Island Shell Club, at (516)-785-8211. Participants should meet at 10 AM by the entrance, with the tour estimated to end at 11:30.

Location and Directions: the Aquarium is located at West 8th Street and Surf Avenue in Coney Island. For information about Aquarium events, call (718) 265-FISH.

By Subway: Take the F or D train to the West 8th Street station in Brooklyn. Then take the pedestrian bridge directly to the Aquarium

By Bus: Take the B36 to Surf Ave. and West 8th St. or the B68 to Surf Ave. and West 5th St. and walk 3 blocks west.

By car from Long Island, Brooklyn and Queens: take the Belt Parkway to Ocean Parkway South (exit 7S). Continue on Ocean Parkway south (Which turns into Surf Ave.) one mile to the Aquarium. The Aquarium entrance will be on your left side.

By car from Manhattan: take the Brooklyn Battery Tunnel (1-678) to the Brooklyn Queens Expressway (I-278). Continue to the Belt Parkway east to Ocean Parkway south (exit 7S). Follow Ocean Parkway directions above.

HIGHLIGHTS OF JUNE 14, 1998 MEETING

The speaker was Dr. David Robinson of the Plant Protection and Quarantine Division of the U.S. Department of Agriculture. He is a trained malacologist who was hired by the Philadelphia Academy of Natural Sciences to identify land snails for the DoA. He now heads the staff of inspectors who examine goods coming into our ports, to try to find and stop gastropods that would be detructive or a menace to health. Dr. Robinson, however, is the only malacologist employed by the U.S. Government.

In his years with the department he has identified about 400 species of gastropods coming into the country, mostly on plants and anima [illegible] As examples of the bad ones he mentioned Achatina fulica, the giant African snail that staged a well publicized outbreak in Miami several years ago, and A. achatina, another African species. It's a food item in west Africa, but causes parasitic diseases because it carries [illegible] todes. His people catch this one four or five times a day, he says. He noted that Euglandina rosea, one of the cannibal snails, has been introduced in several parts of the world in the hope that it would kill off Achatina, but it wiped out smaller species instead. There are species that have destroyed rice crops in the Philippines and Indonesia, and rice growers in our southern states don't want them in their fields.

LANDSHELL PERIOSTRACUM

Richard Goldberg

(reprinted from AMERICAN CONCHOLOGIST, VOL. 26 (2))

From my observation and experience with land shells, both in the field and in preparation for collections, almost all terrestrial and tree dwelling mollusks have some sort of periostracum. The only exceptions to this are the calciphile species such as the limestone dwelling operculates, and similar species.

Land shell periostracum can be a thin, transparent or translucent covering, or an opaque and tinted covering that envelops the entire shell. In the case of many _Helicostyla_ and related genera, the periostracum forms an intricate pattern that, from the collector's point of view, adds an aesthetic quality to the shell. This patterned periostracum is sometimes referred to as cuticle. Unfortunately, as we know, bleach will remove all types of periostracum. And many land shells, especially the commercially collected shells, are batch bleached, removing any hint of periostracum. Many of the ground-dwelling terrestrial mollusks have a thin, or thick chitinous-like periostracum that in some species tends to become flaky and peel off over time. I personally find the periostracum an important characteristic of the shell. In a few cases, it can also help aid in the identification of the species.

The thin, transparent or translucent periostracum of many species does tend to intensify the color of the shell underneath. the _Amphidromus_ species in the subgenus _Syndromus_, and one species in particular, _A. (S.) inconstans_, have a base shell color of bright yellow (see the cover of the June 1997 issue of _American Conchologist_). With the periostracum intact, the yellow color is deep yellow -- almost approaching a yellow/orange in fresh specimens. When the periostracum is bleached off, the yellow color becomes extremely light, almost yellow/white. The yellow pigment is in the shell, but the periostracum adds a tint that deepens the color, almost like holding an amber colored photographic filter to your eye and viewing a yellow object. This intensification of color is exhibited with most of the _Syndromus_ species. In the case of _A. inconstans_, both the light and dark tints are aesthetically pleasing, so it is personal choice whether you keep the periostracum intact.

Removing the periostracum in some species can also cause another problem. For instance, the large _Megalobulimus_ of South America have a thin, but tough ochre/amber colored periostracum which adds a sheen to the surface of the shell. When bleached, some of the _Megalobulimus_ shells become dull and chalky, as does M. oblongus. The periostracum-less shells of other _Megalobulimus_, _M. terrestris_ for instance, are shiny, so it really makes no difference whether you remove the periostracum, other than in the tint of the shell.

On the other hand, if you bleach a species like Asperitas everetti, the large, dark green Ariophantid from Flores Island, you will be sorry. What you will be left with is a drab, mauve colored shell with virtually no resemblance to the fresh shell with periostracum.

It would be next to impossible to list every land species to indicate whether bleaching would be a benefit or detriment to the shell. My suggestion is not to bleach any land shell when at all possible. In fact, the small thin-shelled species may dissolve if dunked in bleach.

Use a soft toothbrush and mild soap to brush away exterior dirt and debris. If the periostracum seems to obscure shell color underneath then it is personal choice whether you remove it or not. As previously mentioned in this thread, an option would be to display one with and one without periostracum. But that often is not an option. The rule of thumb is, if the shell has color, don't bother bleaching; if the shell is drab and looks like it would benefit from cleaning, then use the toothbrush and mild soap route. Nine times out of ten you will be glad you did.

--Written for CONCH-L 1/4/98

THE NAME OF THE GAME

Bill Bailey

(reprinted from AMERICAN CONCHOLOGIST - Vol. 26 (2)

The traditional objectivity of scientific writing sometimes leads scientists to inject a little of their personality into their nomenclature. Thus nuclear physicists measure not in nuclear cross sections but in barns ("as easy to hit as..."), and some chemistry students I used to know referred to any sugar they couldn't identify as "godnose" or"whonose". Zoological taxonomy provides a rich field, starting with the amoeba, Chaos chaos L., as Richard Coniff has found (Smithsonian, December, 1996). Naming a beetle Agra vation presumably relieved some frustration the animal had caused, while arachnophobia emerges in the name Draculoides bramstokeri. But what amorous, if fickle, musings refulted in bugs being named Peggichisme, Polychisme and Dolichisme? Most of these "Soundslike" names are deliberate (e.g., the intellectual fly Phthiria relativitae) but Dyaria is a lepidopterist's unfortunate tribute to H. G. Dyar.

Among molluscs,Coniff mentions an unbelievable snail Ba humbugi, and the superheroic squid, Batoteuthis. In The Shell Makers, Alan Solem names may commemorate a resemblance--the ballerina-like muricid Typhina pavlova, or the circumstances of discovery--

the clam Ascitellina urinitoria washed from "dredged mud in the scuppers of a small boat near the end of a long day at sea." For pinpoint accuracy it is hard to beat the name of the tiny snail Punctum pygmaeum, which resembles a ... Does this species rattle around in its genus, or share it with an as-yet undescribed?? Or even a !!

-Reprinted from the Bulletin of the Malacological Society of London, February, 1997

LEGO LANDFALL COMING TO COAST

(Jacksonville, Monday, May 18, 1998)

(reprinted from Central Florida Shell News, June 1998)

MIAMI - Any week now, a bright, yellow life raft should wash ashore somewhere on the Florida coast, ending an epic voyage spanning more than a year and thousands of nautical miles.

Since the raft-bearing the brand name LEGO- is about the size of a fat sardine, it probably will escape notice. But that won't last long.

Because out there in the deep blue are another 28,699 rafts exactly like it, along with 3.1 million more miniature plastic objects such as diver flippers (418,000 pairs in red, black or blue) frying pans (18,200 in black) and swords (92,400 in gray). It's a veritable LEGO armada, part of a cargo the Danish toymaker lost last year off England, and it's drifting toward our shores.

At least that's the projection of Curtis Ebbesmeyer, a Seattle oceanographer and foremost authority in the arcane field of tracking marine trash. "They should wash up this summer," said Ebbesmeyer, who edits the newsletter Beachcombers Alert! (www.beachcombers.org). "That's the good news," he said. "The bad news is you'll have to get down on your hands and knees to find them..."

And LEGO pieces merely top the list of flotsam floating Florida's way, said Cathie Katz, a Melbourne Beach author of nature books and editor-publisher of The Drifting Seas, a newsletter named for floating tropical plant pods called sea beans.

Last year's weather, influenced by El Nino, kept lots of lost cargo offshore, she said. This fall, she expects East Coast sands to be scattered with items from toilet seats to golf bags to plastic bags originally bound for an Irish grocery chain stamped with the slogan: Help Save the Environment. "I'm predicting a surge of activity," Katz said. "It's almost like we're going to get a double whammy this year."

Freighters are the primary source of this strange stuff. They lose a surprising amount of cargo, generally when rough seas send storage containers tumbling from deck to drink. One industry magazine reported 1,000 containers lost in December and January alone, Ebbesmeyer said.

For Ebbesmeyer, who helps companies figure how currents will disperse oil or pollution spills, following flotsam isn't a paying job, but it has become a passion. His mother's curiosity got him started. In 1991, she called him about reports of Nike shoes washing up along the Pacific Northwest. Could he solve the mystery?

Ebbesmeyer traced the probable source. The previous May, the ship Hansa Carrier lost containers with 80,000 pairs of Nikes in high seas between Korea and the West Coast. Ebbesmeyer and fellow oceanographer James Ingraham of the National Marine Fisheries Service produced a computer simulation showing currents sloshing sneakers up on Vancouver Island 220 days after such a spill--right on the mark.

The next year, the scientists wrote an analysis for an academic journal tracking 29,000 plastic bathtub toys (yellow duskc, blue turtles, red beavers and green frogs). Some, now considered collector's items, made Alaska. The rest likely drifted into Arctic waters, where they're locked in ice awaiting a thaw to contine their journey. Last year, Ebbesmeyer forecast the landfall of 34,000 hockey gloves along the Pacific coast.

It sounds like silly stuff, but Ebbesmeyer emphasized, "It really is science."

The LEGOs pose an especially intriguing loss. On Feb. 13, 1997 a rogue wave rocked the Tokio Express 20 miles off Land's End, England. The ship rolled 60 degrees one way and 40 the other, flinging 62 containers overboard, including one containing 4,756,940 LEGO pieces. The parts, in 100 shapes, were to be placed into kits in Connecticut.

Ironically, many were sea-related. Along with the rafts and fins are tiny life preservers (26,000, yellow), scuba tanks (97,500 gray), diver legs (132,000, gray and yellow) and octopuses (4,200, black). "I guess the ocean really wanted to play," he chuckles.

LEGO sent Ebbesmeyer samples and a manifest. Working with his sophisticated test tank--a bucket--he found 53 types floated and calculated that as many as 3,176,407 pieces could be adrift. Ebbesmeyer knows at least some escaped the container because pieces washed up in Cornwall, England, including dragons (33,941, black and green). By summer, he expects people on the opposite side of the pond to be finding LEGOs, too.

"It takes about 14 months to go around the Atlantic gyre, down to Spain and then looping over to Florida, basically the route Columbus followed," he said. The gyre is the loop formed by the currents circulating in the North Atlantic - the Canary, the North Equatorial and the Gulf Stream. Pieces cill flow north to the Carolinas, but winds and waves should bring pieces ashore in Florida, Ebbesmeyer said.

TOXIN-EATING MUSSELS THRIVE ON LAKE'S BOTTOM

(Reprinted from The Orlando Sentinel, October 26, 1997)

Zebra mussels are migrating in Lake Erie to a place scientists never thought they could live--the lake's soft bottom. The mussels which arrived from Europe in the 1980's, had been known to colonize only on hard surfaces. The mussels have clogged water pipes, causing problems for water systems. Zebra mussels absorb toxic sediment from the lake bottom so toxins could work their way back up the food chain--possibly to humans.

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FOUNDED JAN. 1949

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NEW YORK SHELL CLUB NOTES No. 349 December, 1998 Page 1

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HIGHLIGHTS OF DECEMBER 13, 1998 MEETING

It was announced that the program for the February meeting would be a shell exchange. Carl Ehrlich said that the October meeting - a trip to the N.Y. Aquarium - and the November meeting - a trip to the Philadelphia Shell Show - had gone well.

Carl had on display a number of specimens of Conus victor, showing the variations within the species. Al Scarpetti showed a number of slides he had selected from the photo files of George Raeihle. Most of them were of mollusks, many of them live. Al said that Mary Ruth Foglino would get in touch with Dorothy Raeihle's family to ask if they want the family pictures from the collection.

The day's program was a search through grunge that Romuald Czepulkowski had bought. Some came from the Mactan Strait, P.I., and was collected using tangle nets among rocks at 40 to 80 fathoms. Other material came from Jeffreys Bay, South Africa. The larger specimens had been removed, but the smaller species were present in satisfying variety and numbers.

A new member, who joined the Club during the fall was introduced. She is Marion Sullivan, a Bronx resident.

PUTTING CONCH BACK IN THE CONCH REPUBLIC

reprinted from the N.Y. Times of
December 29, 1998

LONG KEY, Fla, Dec. 28 (AP) - The Conch Republic is conched out.

The mollusk meat in the conch chowder served in just about any restaurant in the Florida Keys probably came from Jamaica or South South America. There just are not enough conch left to harvest in the Florida Keys, despite its nickname as the Conch Republic.

Bob Glazer and the State of Florida are trying to change that.

In Giant tanks behind the Keys Marine Laboratory crawl the snail-like animals (pronounced "konk") that Mr. Glazer hopes to reintroduce to the waters around the Keys.

There is more at stake than biological diversity. The high school teams in Key West are known as the Conchs. Tourists ride around town on the Conch Train.

Babies born in the Keys get Conch Republic birth certificates that say they are officially Conchs. People who move to the Keys earn the right to be called "freshwater conchs" after seven years.

Mr. Glazer, who works for the Florida Department of Environmental

Protection, is a freshwater conch. But he knows more about mollusca gastropoda strombidae strombus gigas -- the Queen Conch -- than most of the natives. And he is determined to bring the animal back.

In 1965, a quarter-million conchs were harvested in the Keys, Mr. Glazer said. Today the conch population is down to only a tiny fraction of that number. Commercial harvesting of conchs has been banned in the Keys since 1975. Recreational taking of the conch was outlawed in 1986.

It was not so much the quest for the tough meat served in chowder, conch fritters, conch seviche or cracked conch that led to the depletion of the species in the Keys. It was more the desire for the shell--the large, familiar pink and white shell that can double as a horn.

The hatchery on Long Key was opened in 1991. Since then, Mr. Glazer and his colleagues have released about 6,000 conchs into the wild and studied them to determine whether laboratory-hatched conchs can survive in the ocean. They tag the animals with aluminum and use metal detectors to keep track of them.

But hatcheries here and elsewhere all have the same problem: Although they produce millions of juveniles each year, their conch planting efforts are plagued by a high-mortality rate.

ZILLIONS OF BUGS INSIDE SOME OF YOUR SHELLS!

by Marcus Coltro

reprinted from AMERICAN CONCHOLOGIST, Sept. 1998

I've always noticed the tiny fine brown dust (the dried mollusk) that falls from some shells. I remember one friend told me once that this is a perfect habitat for acarids. So I took a little bit of this dust and in my microscope I didn't see a thing. But I left for a few minutes and decided to take another look; little creatures were crawling all over the dust! There were to many of them that I wondered how many could live inside a shell. In this little portion I counted more than 30! I don't have to tell you that I decided to wash all my stock, especially the ones in which I smelt a "perfume" which all of you know very well. The scientific name of these tiny shell tenants is Dermatophagoides pteronyssimus and a lot of people are allergic to them. Even if you are not allergic, you may recall times when you were handling some of your old shells and started to sneeze or your nose itched...

Of course there are zillions of these small bugs everywhere, but I suggest keeping your collection in a ventilated and dry place.

We have here in Brazil a small machine that they say keeps this disgusting creature away from a small area or room. I don't know if it really works, but I saw it inside the mummy cabinets in Cairo, Egypt. I have some in my office, but the best way is to periodically wash the collection, or at least any suspect shells. And of course if it doesn't work, you still can use some antiallergenic medicine...

BOOK REVIEW by ALLEN AIGEN

ATLAS OF FLORIDA FOSSIL SHELLS (Pliocene and Pleistocene Marine Gastropods)

By Edward J. Petuch, Ph.D.

The Plio-Pleistocene of the Florida Area was until recently very poorly documented except for the fairly well known Caloosahatchee fauna. Even that was best documented by a recently reprinted 1953 monograph by Olsson and Harbison and not updated except by a few publications of Petuch. But the younger and older faunas above and below were known only from a scattering of obscure publications. Often it was impossible to tell which stratum the shell came from, precluding any understanding of evolutionary relations. In the 1960's, '70's and '80's development in Southern Florida allowed collectors to have access to quarries, canal diggings and excavations which were filled with a wealth of fabulous fossils, but they had no way to make sense of many of them. They could often only guess that they had unnamed species from material of an unknown age. The most prolific paleontologist who was working with this material and who had access to all the best locations was Ed Petuch. Petuch described the standard stratigraphic section in Sarasota consisting of what are now widely known as "Petuch Units", and in the Everglades. He collected the shells in-situ as much as possible, allowing similar but distinctive forms, which come from different faunas, to be distinguished as species, rather than to be considered varieties of long lasting species.

This book is essentially an illustrated check list of the fossils that Petuch and many amateur collectors have found from the Florida area. For the first time, in one book, you can have a clear, black and white photo of virtually every named macrogastropod (about 10 mm. of larger) species known from the Pliocene (about 3 million years ago) through the Pleistocene (Ice Age) found in Florida. Many of the older species are found also from as far south as the Caribbean and Central America and from as far north as the Carolinas. Many of the youngest species are still alive in the Florida area. About 1100 species and subspecies are illustrated, mostly with one, but many with two or more photos, showing variation. Many of these species are from obscure publications, were described from uncertain strata, and have never been well known. Each species is listed with the original reference, size and source location of the pictured specimen, and the stratigraphic units it is known from. This book allows shell collectors to finally make sense of their fossils, to convert a bunch of shells into an organized collection. It is also exciting to realize that if you have a species from this area not in the book, it is still unnamed. I have a few for which I am hoping to see published descriptions.

Petuch described and named about 300 new species and subspecies in this book. He has also named 10 new genera and two new subfamilies, impacting popular Recent groups like muricids, busyconids and strombids. He has also updated many species, both extinct and living, by putting them into new genera for the first time. However, as only the original reference is given, it is not clear when a combination is one of Petuch's. Even collectors who do not collect fossils, but want up-to-date names will find this book to be valuable. For instance, it allowed me to change a living and fossil buccinid (_Colubraria lanceolata_) into a cancellariid (_Tritonoharpa lanceolata_). It's an illustrated summary of much modern research which has not been reflected in the popular shell books.

The Atlas is divided into essentially six parts. After an acknowledgment of past workers in the area and people who helped the author, there is a chapter summarizing the stratigraphy that forms the time/rock framework in which the shells are found. Clear charts and diagrams make the information easily accessible even for those without a geological background. Next is a summary of the major genera characterizing the faunal units used in the Atlas, giving an idea of their biogeographical extent. A major chapter correlates the different faunas and formations and shows their areal extent. This chapter includes good maps and well-drawn ecological reconstructions of the faunas. Next are 100 plates, which, as the title implies, is the main part of this book. There are eight to twenty photos per plate, averaging about twelve. The photos are grouped systematically with data on the facing pages. Thus if you have, for example, a fossil cone, you can look through the six pages of cones until you find the group it belongs in, and then carefully compare pictures to specimens. The photos are large, clear and of good specimens, but the specimens were not coated (which would have made details of ornamentation and surface texture clearer). Some of the photos show preserved color patterns, but most do not. Photos under ultraviolet light, which helps show color patterns, were not included.

The systematic section includes descriptions of all new taxa, but only the new taxa. The descriptions are sparse, as are the comparisons to other species. There is a list of plates, a systematic list of new taxa, a six-page bibliography and a useable systematic index in which all species are listed by genus.

Although the Atlas is indispensable for collectors and reseachers, like all Petuch's work, it is not without its critics. There are many minor points which cause annoyance or uncertainty, due to the weak editing of this book. There are a few misplaced plates, misidentified photos, incorrect location data, and other points a few of which have been addressed in a correction page. It would have been useful for new species to ~~have~~ the page number for their description on the plate text. Other points, like full synonomies, would have improved the product but delayed its publication and increased its price. It is also distinctly limited. Fresh water and land shells which are found associated with some of these faunas are not addressed. Bivalve collectors, and collectors of microgastropods will need to wait and hope. Collectors of Miocene and older Florida fossils won't find their shells here (but they have been already better documented elsewhere).

The other objection, common to much of Petuch's systematic work, is caused by the fact that he carries on a tradition of pioneering work that is now largely out of style among malacologists. The 300 new species in this book are more than many malacologists will describe in their lifetime. The accepted standard for descriptions of new species is now much more detailed than Petuch's. Few malacologists are now willing to go beyond their narrow focus to encompass entire new faunas, as W. H. Dall did 100 years ago. Although Petuch's descriptions are adequate, if the groups were divided up among experts in each family, the descriptions would certainly be more detailed. And this book wouldn't have been puablshed in any reasonable amount of time or at an affordable price.

Petuch has named distinct forms as index fossils, indicative of the fauna from which they were found. This enables researchers to know which strata are involved when fossils are found in the field. This is especially useful when faunas have been dredged and mixed together. These index fossils also allow long-distance correlations of strata, critical to understanding the stratigraphy of Florida, which is still poorly known. However, some researchers, myself included, doing population studies of these species, question the ability to consistently distinguish many of Petuch's closely related species, as most specimens are not as distinct as the holotype, and the species appear to be very variable.

There are many exciting philosophical questions that are raised concerning the evolution and definition of species of fossils. Much work will need to be done before there is agreement among the majority of researchers. But that is the nature of science. Questions are raised, hypotheses are proposed, attempts are made to document their truth or to disprove them. This is a normal, ongoing process of science. Petuch puts out more hypotheses than most most researchers, but with meager documentation to support them. This leaves him open to attack by others, sometimes fairly, sometimes not. Right now there is a common tendency among workers toward consolidating distinct forms into variable species. Perhaps careful DNA analyses will ultimately show that they are actually distinct species, even if they can't be reliably distinguished by shell characteristics alone. This would tend to vindicate Petuch's philosophy, but would be hard to apply to fossils. It would also drive collectors nuts trying to name their isolated specimens. However, science is not done for the sake of collectors, even though they may make valuable contributions.

I expect Petuch's Atlas will remain the standard reference for southern Florida macrogastropod fossils for generations. Buy the book before you buy the shell, or before you plan the collecting trip.

> Atlas of Florida Fossil Shells is copyright 1994, published by Chicago Spectrum Press, 1571 Sherman Ave., Annex C, Evanston, IL, 60201
>
> There are 394 hardbound 8½"x11" pages including 100 plates and 21 text figures.
>
> Also available for $60 from
> Graves Museum of Archaeology & Natural History
> Dania, Florida
> (This Museum houses many of the shells figured.)

DEEP APPRECIATION

by Steven Austad

Book Review of CIVILIZATION AND THE LIMPET by Martin Wells; from NATURAL HISTORY, November 1998

One of the challenges and satisfactions of scuba diving is mastering that state of grace known as neutral buoyancy, in which one floats effortlessly upside down or sideways, neither ascending nor descending--the way astronauts float in space capsules. Maintaining neutral buoyancy is nearly impossible for humans. Even tiny errors in adjustment get exaggerated. A bit too much air intake in your balloonlike buoyancy-control device, and you slowly begin to ascend. Ascending reduces the water pressure, causing the air providing your buoyancy to expand, so you rise ever faster. Another error could start you descending instead, and you would soon be hurtling downward into the abyss.

So when we dive, most of us remain at our chosen depth by actively, inelegantly flapping our arms and legs. Like human divers, most marine creatures prefer to spend their lives suspended somewhere between the surface and the seafloor; in other words, they are also well served by a mastery of neutral buoyancy. As Martin Wells reveals in one essay in his new book, the various ways they do so not only are fascinating but also help explain why fish frum the depths are usually D.O.A. on a trawler's deck, and why deepwater squid are never found on your sushi plate.

Wells is a zoologist, diver, yachtsman and keen observer of generally underappreciated sea creatures, particularly those--such as jellyfish, lugworms, and limpets--that lack joints, jaws, backbones, and teeth large enough to terrorize teenage moviegoers. Like all good zoologists, he values animals for more than their inherent charm; he understands how they are constructed, can decipher their evolved solutions to special environmental problems, and tries to imagine what their sensory world might be like. Unlike most xoologists, however, he has a flair for connecting his professional insights in interesting ways and then relating them to aspects of life beyond science. He also enjoys communicating these insights and connections to more casual observers of the natural world.

In his title essay, Wells begins by asking a straightforward question: How do limpets find their way back from their favorite algal dining spots to their home niche among the intertidal rocks? He then proceeds to consider why snails, worms, and even octopuses, with all th their formidable intelligence, cannot learn, as arthropods and vertebrates do, to navigate mazes or distinguish the three-dimensional shapes of objects by feeling their outline. The answer turns out to be that creatures need movable joints to measure distances accurately and to be able to repeat movements precisely. He finishes the essay with an appreciation of how animals' ability to measure distances is a necessary condition for navigating by the stars (and by compass) or for building computers or civilizations. The pleasant thing about such essays is that as you learn a bit about the animals, the provocative connections invoked also stimulate novel thoughts.

* * * * * * * *

Wells has a spare, informal writing style and a good sense of metaphor (he describes the hard-shelled mollusks' defense when they "pull back into the castle and slam the door" as a "medieval tactic").

* * * * * * * *

He also enjoys dispensing practical advice on everything, including how to avoid venomous sea creatures, how to cheat on a Breathalyzer test (hint: try hyperventilating), and the best way to pick up an octopus or cook a mackerel.

* * * * * * *

UNSCRAMBLING TIME IN THE FOSSIL RECORD

Time is the great bugaboo of paleontologists. All to often, a thin sliver of the fossil record spans a vast sweep of geologic history that is too broad to show exactly how, and how quickly, evolution works: how one species gives rise to another, why one species dies out and another survives, or how an invading species does battle with the defending locals. Now two researchers have stretched a fossil record that would normally look like an instant of geologic time into a portrait of a prolonged evolutionary transition.

Geochronologist Glenn Goodfriend of the Carnegie Institution of Washington's Geophysical Laboratory and paleontologist Stephen Jay Gould of Harvard University used a combination of two dating techniques to extract a 15,000-year-long record of one campaign in a land snail's long and ultimately successful battle to win the Bahamian island of Great Inagua from a native species. They reconstructed this evolutionary shift, which ended whithin the past few thousand years, from a single, jumbled bed of snail shells. "The significant thing is that Goodfriend was able to put things in order," says paleontologist Stephen Stanley of the Johns Hopkins University. "It's a neat way to sort out (fossil) ages." In this case, it revealed a surprisingly prolonged intermingling of an invading species and its eventual victim.

Gould picked up the fossilized shells from a sand flat on the south shore of 80-kilometer-long Great Inagua. If they had come from the usual sort of stratified fossil deposit, Gould says they would probably have told a far less interesting story. The deepest and therefore oldest snail fossil would be Cerion excelsior Gould, 1984, above that would be a thin layer in which the invader C. rubicundum (Menke, 1829) are mixed together, and there would be C. rubicundum -- now a widespread form -- by itself. "It would be a classic punctuation" in the evolutionary record, Gould notes, a transition from one species another that appears to be geologically instantaneous. Gould himself co-originated the term "punctuated equilibria" more than 20 years ago to describe in particular the abrupt formation of new species. Abruptness, he argued, was the evolutionary norm: Speciations appear suddenly, he said, rather than gradually over hundreds of thousands or millions of years, as had generally been assumed.

Goodfriend and Gould set out to put the shells of the temporally jumbled Cerion fossils in chronological order to try to trace just how abrupt this invasive transition really was. Absolute dating of enough shells by the radiometric carbon-14 method would have been too expensive, so Goodfriend used the more economical technique of amino acid racemization to determine their relative ages. The amino acid molecules that make up proteins come in only the L structural form but, with time, slowly transform, or racemize, into an equal mix of the D and L forms. When amino acids from 19 shells from the sand flat were analyzed, the oldest, which were dated to 16,000 years and older by carbon-14, were pure

C. excelsior, while younger fossils had shell shapes and intermediate in appearance between C. excelsior and C. rubicundum, and the youngest of the intermediate forms were just 3,000 years old.

Apparently, C. rubicundum arrived on the island and interbred with the indigenous C. excelsior to produce hybrids at this site with characteristics of both species, says Gould. Either the two species coexisted on the island to produce hybrids on the south shore during thousands of years before C. excelsior disappeared entirely, or it became extinct earlier, and the hybrids sustained themselves.

"The great thing is that they've projected the (snail) population they see now back in time," says paleontologist David Jablonski of the University of Chicago, "and put a number on how stable these hybrids actually were. It's evolution in action." And that evolution may surprise some paleontologists. "Many people think hybrids are short-lived," says paleontologist Gary Vermeij of the University of California, Davis. "Here they lasted a long, long time" without merging with or losing out to another species.

Gould is quick to point out, however, that this transition was not gradual, as paleontologists understand the term. Punctuated equilibria is often misinterpreted "as a catastrophic, one-generation, overnight theory," he says. "It's never been that." Evolutionary change may be slow on the scale of a human lifetime, he says, but 5,000 or 10,000 years is still abrupt in geologic time.

(Adapted from Science 274, no. 5294, 13 Dec. 1996)

NOTE: The foregoing article reprinted from THE SHELL-O-GRAM - Vol. 38 (2)

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Sunday, May 9, 1999 James Cadiero: Fresh-water Mollusks of Central Africa	2:00 PM	American Museum of Natural History Rm. 319
Sunday, June 13, 1999	2:00 PM	American Museum of Natural History Edith C. Blum Classroom

NOTE: Details, with auction list and location will be mailed about the end of March.

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COMING ATTRACTIONS

NEW YORK SHELL CLUB ANNUAL SOCIAL & AUCTION

Sunday, April 11, 1999

at

Dorothy Jensen's Broadway Dance Studio
31-08 Broadway, Astoria, Queens

We welcome donations of specimen shells, shell books, and shell-related items, to enhance the interesting selections we now have.

Your attendance and donations are most appreciated because funds raised from the auction cover the cost of our routine activities, which include printing and mailing our quarterly NYSC NOTES.

Also, we need help in providing refreshments, as well as assistance before and during the auction. As in past years, a list of auction items will be mailed to local members and friends about the end of March.

NEW YORK SHELL CLUB

A HALF CENTURY OF ENLIGHTENMENT, ENRICHMENT AND JUST PLAIN FUN

Milton Werner

The New York Shell Club turned 50 in January, rounding out a half-century of programs, activities and associations that made conchology more rewarding, more fascinating and more fun for the for the hundreds of collectors who attended meetings and social events, went along on trips, gathered at odd times to get the behind-the-scenes jobs done, and read SHELL NOTES.

The two founders of the Club, Karl Jacobson and Dr. Walter Jacobs, are gone, and so are a host of shell-wise and convivial souls whose contributions and presence made membership an irreplaceable experience. But at meetings these days we can still look forward to saying hello again to a near-founding member. He is, as many of you probably know, Nick Katsaras. He joined up at the Club's second meeting, and fittingly enough, still serves as our historian.

From the beginning, the Club has met at the American Museum of Natural History in Manhattan, and this many-phased association has been of benefit to both. It would be satisfying to feel that we are well started on our third quarter-century together, but given the lures and demands that compete for people's attention these days, we of the Club can only hope that the beauty and fascination of shells will continue to engage a fair share of New Yorkers and their neighbors.

THREE THOUSAND TEETH

What animal has 3,000 teeth, four slimy noses, is a bane to gardeners and a boon to science? Why, 'tis our common slug, Limax maximus Linne', 1758. Everybody knows that, says the Wall Street Journal in a nearly full-page article.

We meet up with him on his sticky trail along every path, though not nearly so often as do residents of Thetis Island, British Columbia, where these mollusks are especially abundant. There, a biolgical supply house ships out many thousands of slugs for studies all over the world. A research worker at the University of Washington believes it is entirely possible that her study of cystic fibrosis and gastric ulcers may hinge on our common slug, or his larger, but rarer relative Ariolimax columbianus (Gould, 1851) (Banana Slug).

Slugs' well-known taste for beer was the subject of a test conducted, perhaps in jest, at Colorado State University, where 2,500 slugs were used to determine their preference of 16 brands. Budweiser ranked first, said the article.

The University of California at Santa Cruz officially adopted the Banana Slug as its mascot in 1986, and it adorns the jerseys of 9,600 students. "Athletes kind of like the idea of the slug's status as underdogs," says the football coach.

Finally, at Guerneville, California, a slugfest is an annual event. A race is featured, held on a one-yard course. The main attraction is a bake-off, where a panel of judges gamely eat their way through slug specialities supplied by local residents. "If snails are a delicacy, why not eat slugs?" said one participant. "And slug pizza isn't bad!" "But a martini, with a slug instead of an olive. tastes just awful," said another.

Editors Note: After much debate, in 1988 the California State Legislature actually passed a bill to make the Banana Slug the official state mollusk. However. the bill was vetoed by a less lighthearted governor. Rumor has it that he was under intense pressure from the state's abalone industry lobby to not favor another mollusk over their product. When contacted recently, a spokesman for the California Department of Fish and Game stated that, at the present time, "There is no record of any legislation that officially designates a State Shell."

and Game stated that, at the present time, "There is no record of any legislation that officially designates a State Shell."

Based on an article by Margaret Teskey, Oregon Society of Conchologists Monthly Newsletter, Vol. 32 No. 2, Feb. 1997 .

(Reprinted from THE SHELL-O-GRAM, Volume 38(2))

MEASURING THE METAL OF MOLLUSKS

Scientists appreciate mussels not just for their taste but also for their value as indicators of water quality. The animals retain pollutants found in their aquatic habitat, withstand dirty environments, and remain in the same spot for all of their adult lives.

Now, new research is distinguishing which contaminants the mussels take in from the surrounding water and which they pick up from their food, phytoplankton. Although regulators usually measure dissolved pollutants to set water quality standards, contaminants in plants and sediment may sometimes prove more important, says Nicholas S. Fisher of the State University of New York at Stony Brook.

In two studies, Fisher and his colleagues examined the concentrations of seven coastal pollutants in two common, closely related mussels, Mytilus gallopovincialis Lamarck, 1819 (Mediterranean Blue Mussel) and M. edulis Linne, 1758 (Common Blue Mussel).

They exposed the animals to water or phytoplankton laced with radioactive isotopes of these metals. After measuring the concentrations and locations of the isotopes in the mussels, the researchers put some of the animals in mesh cages off the Mediterranean coast for up to 4 months and left others in aquariums containing Mediterranean seawater.

The selenium, lead, cobalt, and americium stored in the mussels came mainly from phtoplankton. Fisher and his colleagues reported in the September 12th Marine Ecology Progress Series. The animals absorbed most of their cadmium from the water. Whether zinc and silver were absorbed primarily from water or food depended on the water conditions.

How much of each contaminant the mussels took in varied considerably. For instance, the animals absorbed 4 percent of americium present in the food or water they consumed and about 60 percent of the silver, Fisher and his colleagues noted in the November issue of Environmental Science & Technology.

Once inside a mussel, the pollutants met with different fates. The animals took from 10 to 60 days, depending on the metal, to expel half of the original amount absorbed.

The authors developed a mathematical model for determining the relative importance of food and water as sources of pollutants in mussels. The model also predicts the amounts of the various metals that the animals will accumulate under varying water conditions.

The metals remain in the mussels' feces for different lengths of time, the team reports. Whereas half of the silver leached out in 18 days, it took 107 days for half of the americium to disperse.

Studying mussel feces "sounds awfully obscure, I realize," says Fisher, but contaminants pass from fecal matter into the sediment, where worms and other fish foods dwell.

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(Adapted from Science News Vol. 151, Jan. 11, 1997; submitted by member Carol Ruckdeschel, Cumberland Isl. GA)

GRAND THEFT GRID TALK

The recent widely reported theft of the American Museum of Natural History (AMNH) specimen of Chimaeria incomparabilis via the Associated Press Wire Service, almost immediately made its appearance on the Conchologists of America listserver and the Internet. The story included everything in which the general public would naturally be interested--the theft of a rare shell, an international transfer of stolen property, and an exorbitant sum paid for "only a seashell". For the knowledgeable conchological/malacological community, it also included the involvement of well-known specimen shell dealers (Marty Gill, Miami and Guido Poppe, Belgium), and a well-to-do Indonesian collector (Widodo Latip).

A majority of the messages dealt with so-called mechanics (who, what, when, where, how) and revealed information such as how the shell was named and by whom, the supposed bad luck associated with the shell, full details of the shells collection, and reports that other speciments had sold for as much as $30,000 with other offers existing for $50,000. However, a few of the messages were more lighthearted.

Obviously piqued by President Clinton's recent campaign fund-raising "irregularities," a subscriber posed the question: "What I wonder is this: If the Belgian dealer sold the shell to an Indonesian, if the Indonesian gives it back, does that entitle him to spend a night in the Lincoln Bedroom?"

The next subscriber asked: "Would you be referring to the Belgian shell dealer or the Indonesian?" The same individual then wondered as to whether the shells data slip might read "Fished from bottom of 1 meter display case by diver, near Hudson River." And he subsequently added: "For $20,000, I'd be looking for the shell's oil change documentation and maintenance records."

These exchanges prompted a third subscriber to offer a list of "Ten reasons to pay $20,000 for a seashell" which included the following:

- It comes with a two page data slip ... none of this "Indo-Pacific" garbage.
- It really is very heavy for its size.

The COA Listserver (CONCH-L) is a collective address (i.e.,sending a message to the listserver by a subscriber causes it to be disseminated via electronic mail to all who have subscribed). Currently, this list includes 267 subscribers from 26 countries, ranging in experience from rank amateurs to professional malacologists at the world's most prestigious institutions. This exchange of information serves to bridge the gap between those who may have collected their first shell to those who have spent a lifetime studying them.

(adapted from THE SHELL-O-GRAM, Volume 38(2))